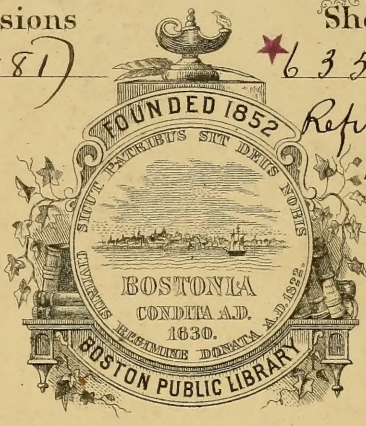
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CITY OF BOSTON.



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REPORT

OF THE

INSPECTOR OF MILK,

FOR THE YEAR ENDING JUNE 25, 1862.

In Board of Aldermen, June 30, 1862.

Read, and ordered to be printed.

S. F. McCLEARY, *City Clerk.*

Btt.
(14,081)
Mar 26, 1890

CITY OF BOSTON.

To his Honor the Mayor and Aldermen of the City of Boston :

Gentlemen : The undersigned respectfully submits the following report for the year ending June 25, 1862 : —

The milk trade of Boston is divided into two classes, for which separate sets of books are kept at the office of Inspector of Milk.

Wholesale dealers are those who distribute milk to families, stores, &c., from carriages ; those persons who keep cows at the south part of the city proper, South and East Boston, are classed with wholesale dealers.

Retail dealers are those who sell milk in small quantities from cellars, stores, and market-places.

There have been recorded the names and places of business of wholesale dealers in milk, number . . .	76
Number of retail dealers in milk	196
" of cases inspected	1,268
Many of the above inspections have been made in private families at their request.	
Number of cases analyzed	10
" of complaints for violation of the milk law .	3
" convicted in the Police Court	2
" appealed to Superior Court, complaint quashed,	1
Number of certificates of analysis for the adulteration of milk, now remaining in this office	6

In consequence of long continued illness of Dr. Charles T. Carney, (the Chemist,) the above six certificates have remained without any complaint being made to the Courts.

Your Inspector has applied to two well known chemists of this city, viz: Drs. Hayes and Jackson, for assistance in the analysis of milk. The former refuses to receive samples, in consequence of not having time to attend to these cases in court. The latter has analyzed, but advised that no complaint should be made, as there is a variation in the milk of cows within the limits ascertained by analysis.

Since the establishment of this office, August 10, 1859, to June 25, 1862, —

There have been recorded wholesale dealers . . .	384
" " " retail dealers . . .	1,503
Number of inspections made	3,911
" of cases analyzed	60
" of complaints made to Police Court . .	61
" " refused by Police Court . .	3
" of convicted	22
" of cases discharged	36

The average number of cans of milk distributed daily .	7,476
The average number gallons distributed daily . .	15,000

In conclusion your Inspector would say, that the establishment of this office has unquestionably had a beneficial effect upon the milk trade of Boston and vicinity.

Some of the dealers who have retired from the milk business, were in the habit of *extending* their milk; their places have been occupied by more responsible men.

The last year's inspection, even in tho poorer parts of the city, shews that the percentage of adulteration is not so large as during the first year of the establishment of this office.

The fact that adulteration still continues to some extent is proved, by the fact when the quantity of pure milk from dairies must necessarily be short, as is always the case at some seasons of the year, the quantity delivered I find is nearly equal to the delivery when pure milk is plenty.

Respectfully submitted,

HENRY FAXON, *Milk Inspector.*

BOSTON, *June* 28, 1862.

City Document.—No. 49.

CITY OF BOSTON.



REPORT

OF THE

INSPECTOR OF MILK.

1863.

In Board of Aldermen, April 6, 1863.

Laid on the table, and ordered to be printed.

Attest: S. F. McCLEARY, *City Clerk.*

CITY OF BOSTON.

To his Honor the Mayor and Aldermen of the City of Boston:—

Gentlemen: The undersigned respectfully submits the following report, from June 25th, 1862, to March 31st, 1863, included:

The milk trade of Boston is divided into two classes, for wich separate sets of books are kept at the office of the Inspector of Milk.

Wholesale dealers are those who distribute to families, stores, &c.; from carriages, those persons who keep cows at the south part of the city proper; South and East Boston are classed with wholesale dealers.

Retail dealers are those who sell in small quantities from market places, stores, shops, and cellars.

There have been recorded the names and places of business of wholesale dealers in milk, since last report, ... 47

No. of wholesale dealers now in the business, 285

No. of wholesale dealers now selling from carriages, ... 227

No. of small wholesale dealers, who keep cows and sell to the neighborhood, . 58

City Document. — *No.* 37.

CITY OF BOSTON.



REPORT

OF THE

INSPECTOR OF MILK.

1864.

In Board of Aldermen, April 4, 1864.

Laid on the table, and ordered to be printed.

Attest: S. F. McCLEARY, *City Clerk.*

CITY OF BOSTON.

To His Honor the Mayor and Aldermen of the City of Boston.

Gentlemen: The undersigned respectfully submits the following Report, from March 31, 1863, to March 31, 1864, inclusive: —

The milk trade of Boston is divided into two classes, for which separate sets of books are kept at the office of the Inspector of Milk.

Wholesale dealers are those who distribute to families, stores, &c., from carriages; and those persons who keep cows at the south part of the City proper, South and East Boston, are classed with wholesale dealers.

Retail dealers are those who sell in small quantities from market-places, stores, shops, and cellars.

There have been recorded the names and places of business of wholesale dealers in milk since last Report	38
Number of wholesale dealers registered	166
" of wholesale dealers now in the business	264
" of wholesale dealers now selling from carriages	207
" of small wholesale dealers, who keep cows and sell to the neighborhood	57
Number of retail dealers in milk recorded since last Report	187

Number of cases of milk inspected	1,467
" " analyzed by chemist	23
With the average amount of adulteration	36.29
Largest amount of adulteration, water intentionally added, in 100 parts	53.49 per cent.
Least amount of adulteration, water added,	16 per cent.
Number of cases pending in the Superior Court at date of last Report	2
Number of complaints in the Police Court for violation of the milk law	12
Number convicted in the Police Court	12
" appealed to Superior Court	9
" convicted in the Superior Court	4
" of complaints made to the Grand Jury	2
" of cases now pending in Superior Court	2
" of gallons for daily supply of milk for the city of Boston	16,595
Daily cost to the consumers	$3,650 90
Number of gallons for supply one year	6,057,175
Cost to the consumers one year	$1,332,578 50

At the close of another year, as Inspector of Milk, I would observe that my undivided time and attention have been given to the duties of the office to which I was appointed; my field of operation has been mostly among the poorer classes of our citizens, and I can only hope that my time and labor have not been spent in vain.

There are three classes of persons who especially require protection from the sale of adulterated milk, viz: the *honest milkman*, the *poor*, who are obliged to buy in small quantities, and *infants*, whose lives depend upon the quality of the milk. The milkmen find it impossible to compete with those who constantly undersell, (and there are many such,) which adulteration enables them to do. The poor do not receive an equivalent for their money, as they have a right to expect. The infant is

deprived of a portion of that nourishment required to sustain life, and the addition of water to milk, long before its use, is deleterious to its quality. In general, the milk furnished to private families, by our milkmen, is free from adulteration; the quality of the milk, especially if adulterated, is in proportion as the grade of society descends: so that the poorer class, who buy in small quantities, from small retail places, receive the largest amount of adulteration, and they are the *least* able to contend with it.

A large number of cases inspected have been in private families, at their request; and samples have often been received at this office from persons outside the limits of your Inspector; in most of these cases, small children were dependent upon the milk for their daily food, and their parents were interested in the quality.

On the 29th day of June, by request, I visited a family in regard to the milk; the lady informed me that her infant was more than two months old, poor and emaciated, and she thought the milk was the principal cause; she had taken pains to secure the milk from one cow, had it left in cans by itself, and paid an extra price; with these precautions, fearing the milk was too rich for the infant, she had at the time of feeding added warm water. I received the can of milk as left by the milkman, and on inspection found it to contain one third water added, which left but a small amount of food for the child.

Three of the complaints made in the Police Court were in behalf of poor families, and others would have been made but for the unwillingness of the parties to appear in Court.

Families are often much alarmed at the unpleasant *taste* and *smell* of the milk, when a little care in feeding the cows would save much trouble; any change of food in large quantities will have a bad effect, and should be done gradually.

It is not supposed the entire suppression of the adulteration of milk in any large city can be accomplished when the supply is not adequate to the demand; water will supply the deficiency.

It should ever be a part of the duty of an inspector to assist

in keeping up the price of milk to a fair standard with other articles of family consumption, so that the producer may be remunerated for his labor. The price of milk remains about the same as in former years, while all articles of food for cows have greatly advanced; consequently, the producers of milk turn their cows to beef, or their attention to the making of butter and cheese, which have nearly doubled on former prices.

In the months of April, May, and June, the milk throughout the city was quite plenty; from various causes, in July and August, the supply was limited, and the unusual hot season increased the demand; again, in September, October, and November, milk was plenty, and generally more free from adulteration; in the months of December, January, February, and March but few of the wholesale dealers could obtain at any price the quantity required to supply their usual customers. This scarcity induced some of the producers to extend their milk, and if returned to them (as it should be) it would find its way back to the city again.

The Messrs. Charles P. and W. K. Lewis, Brothers, manufacturers of condensed milk, came to the rescue with at least one thousand gallons per day.

It will be observed that a larger number of cases have been analyzed than there were complaints made in Court. These cases were paid for by parties more directly interested, and not within the limits of your Inspector; five or six were against producers in the country, who extended their milk to be sold in this city, and by the assistance of this office they have been brought to justice and more severely punished than they would have been here.

Some individuals in this community have been excited under the belief that *factories* for the manufacture of milk existed in this vicinity; years of experience as Inspector, and the analysis of nearly one hundred samples taken from different parts of the city, have failed to furnish any proof of the existence of any such places. When milk is found adulterated, it is sometimes

done by the producer, generally by the milkmen, and on their premises, by the addition of water; sometimes burnt sugar and common salt are used. By analysis, in two or three instances, only magnesia and corn starch were found. There can be no profit in the adulteration of milk, except to increase the quantity.

The excitement produced a few years since in one of our large cities by the bad quality of the milk and the cruel manner in which the cows were kept need excite no alarm here, as only a small portion of the milk is produced within five miles of this city; the Worcester, Fitchburg, and Lowell trains bring in a large amount daily; some from towns in New Hampshire, and not a little from places nearer Boston.

In our immediate vicinity the cows are fed to some extent on brewery grains. It was thought a few years since of sufficient importance for the State to pass a law prohibiting their use, and a number of complaints were made and the offending parties arraigned before our courts, which brought the subject fairly to be investigated. Samples of the milk were analyzed, and the testimony of some of our best chemists proved that the milk produced from cows fed on brewery grains contained nothing injurious to the quality.

The law was repealed. It is well known, however, that these grains have a tendency to force the cows to an increase of milk, and the percentage of cream is not so large as on milk from the country, where these grains are not used.

Some of the wholesale dealers in milk supply private families exclusively; others the stores, shops, &c., and have but little if any family custom. Many of these men do a fair, honest business, and supply their customers with unadulterated, good milk. Others, who would not be guilty of extending their milk, at certain seasons detract much from its original goodness by removing a portion of the cream from the top of the can, and filling it up again with milk. Others, who think they are only doing a fair business by running their milk through the cooler at one eighth water added, and their class of customers but sel-

dom finding fault, feel quite safe from being annoyed by the Inspector, as one of our chemists has often testified in court that twenty-five per cent. water could be added to pure milk without being detected even by a chemist. And, again, from time to time many paper articles appear, having a tendency to mislead the public mind in regard to our milk, its qualities, percentage of cream, its adulteration, and a variety of other matter taken from scientific men and books in the countries of Europe. We know that the rough, rocky country of New England furnishes as *good* milk as any of the countries of Europe, and it is believed by many in this community that the time is past when men of experience and scientific knowledge in the analysis of milk cannot determine the amount of cream, and the percentage of water added in its adulteration.

There are not a few wholesale dealers who extend their milk, as circumstances require, sufficient to pay a large proportion of their expenses, and to defend themselves whenever prosecutions are brought against them. A low estimate of one man's water trade amounted to more than one thousand dollars a year, and he not so largely engaged in the business as many others. Some of these men could not continue a month in the business were it not for the water sold to the poorer class of our citizens; and many of the latter thus cheated, if summoned to appear in court, are unwilling witnesses, and but little dependence can be placed upon their statements.

Many of the above class have been brought before our courts, some of them three or four times, and always evaded justice by the weakness of the law, and with the aid of able counsel who defend them.

Many of these wholesale milk routes are changing owners continually, and vary in price according to the number of customers and the quality of milk delivered, and are sold from two hundred to five thousand dollars.

Some of our large retail places in the summer sell from twenty to forty gallons of milk daily, and make it a leading article

of trade, although the profit to them on the milk, if any, is small indeed. It is kept to accommodate their customers, and assist in drawing trade. In many of these places the milk is free from adulteration, and of good quality, and sold with liberal measure at less than cost. This, however, is more than made up by increased custom, and the sale of other articles.

The small retail dealers are obliged to buy their milk at the lowest price, and sell at small measure, as their limited means will not enable them to compete with their more wealthy neighbors. Many of these actually encourage the adulteration of milk, not being willing to pay a fair price for a pure article. Their only aim is to obtain the largest amount for the least money, without regard to quality.

In 1848 – 49, the legislature of this State, by urgent appeals, passed a law for the punishment of persons engaged in the sale of adulterated milk, with a provision that all cities in the commonwealth should appoint suitable persons as inspectors, whose duties should require them to prosecute all violations of law. This law has failed to fulfil the intentions of the legislature. Out of many cases which have been brought before the courts of inferior jurisdiction, where convictions were promptly obtained, but one or two have stood the test of a final hearing before the Supreme Court, and in those cases points of technical defence were not urged which, in other cases, proved fatal to the indictments. The law, as it at present stands, is too complicated, requiring proof of matters irrelevant to the real issue, and puts upon the Inspector a burden which seriously impairs his powers of performing his duties satisfactorily to the public, or himself.

I have ever found the prosecuting attorneys and officers of the courts ready to assist me in the performance of my duties, and in the attempts to secure the convictions of offenders against the law regulating the sale of milk; and I feel obliged to especially mention the valuable services rendered by Dr. James C. White, the chemist employed by this office, who, notwithstand-

ing the many calls upon his time by his professional and official duties elsewhere, has given to the business the most prompt and careful attention, and whose professional skill I deem of great value.

Since I have commenced preparing this Report, a law amendatory of the present milk law has been presented to the legislature, and passed to a third reading in the House of Representatives, which, in the opinion of good counsel, will obviate many of the objections to the present law.

Respectfully submitted,

HENRY FAXON, *Inspector.*

City Document. — *No.* 37.

CITY OF BOSTON.

SIXTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1865.

In Board of Aldermen, April 3, 1865.

Laid on the table, and ordered to be printed.

Attest: S. F. McCLEARY, *City Clerk.*

CITY OF BOSTON.

To his Honor the Mayor and Aldermen of the City of Boston: —

Gentlemen: The undersigned respectfully submits the following Report, from March 31, 1864, to March 31, 1865, inclusive.

The milk trade of Boston is divided into two classes, for which separate sets of books are kept at the office of the Inspector of Milk.

Wholesale dealers are those who distribute to families, stores, &c., from carriages; and those persons who keep cows at the south part of the City proper, South and East Boston, are classed with wholesale dealers.

Retail dealers are those who sell in small quantities from market-places, stores, shops, and cellars.

There have been recorded the names and places of business of wholesale dealers in milk since last Report,	42
Whole number of wholesale dealers registered to date,	676
Whole number of wholesale dealers now in the business,	264
Whole number of wholesale dealers now selling from carriages,	206
Whole number of small wholesale dealers, who keep cows, and sell to the neighborhood,	58

Number of retail dealers in milk recorded since last Report,	145
Whole number of retail dealers in milk recorded to date,	1,960
Number of cases of milk inspected since last Report,	1,364
Number of cases analyzed by chemist,	25
Average amount of adulteration,	36.92¼
Largest amount of adulteration, (water intentionally added in 100 parts,)	48.84
Least amount of adulteration, water added,	13.96 per ct.
Number of cases pending in the Superior Court at date of last Report,	2
one of which has been convicted and one discharged.	
Number of complaints in the police court for violation of the milk law,	4
Number convicted in the police court,	4
" of complaints made to Grand Jury,	14
" of cases convicted in the Superior Court and paid fines,	5
Number of cases convicted in the Superior Court and appealed to the Supreme Court,	3
Number awaiting the decision of the Supreme Court,	5
Number of cases defaulted,	1
Number of gallons for daily supply of milk for the City of Boston,	15,733
Daily cost to the consumers,	$5,034 56
Number of gallons for supply one year,	5,742,545
Cost to the consumers one year,	$ 1,837,614 40

I would remark that my whole time and attention have been given to the duties of my office. In the case of private families, where my services have been required for the examination of milk, I have promptly answered every call. The number of these cases has been quite large, and in each I have continued my visits and taken such measures as to secure an improve-

ment in the quality of the milk, or to bring the offending dealer to the punishment provided by law. Stores, shops, and other places where milk is kept for sale, have also received frequent attention, and the quality of the milk sold has generally been kept up to a fair standard.

When not occupied in investigating complaints, I have thought it my duty to visit all places within the city limits where milk is sold, and inspect the same, a record of which inspection is made in the books of this office.

My mode of procedure is as follows: —

Upon examination, finding that the milk left at any place is of bad quality, I leave a written notice for the dealer, notifying him of the bad quality of his milk, and requiring him to furnish better. If the notice is disregarded and the quality of the milk is not improved, I resort to the measures provided by law for the punishment of venders of adulterated milk.

At the date of my last Report, an act regulating the sale and inspection of milk, was before the Legislature, and was afterwards passed and became a law.

By this the rights and liabilities of dealers in milk are more strictly defined, and the measures for correcting their misconduct more plain and efficient; and your Inspector has found himself able far more effectually to check the sale of adulterated milk, and to secure to buyers a fair equivalent for their money; of course it is impossible wholly to prevent or cure the abuse. But under the new law, efforts to that end have been attended with a far greater degree of success than under those previously enforced.

The contracts for the supply of milk are generally made twice a year, viz: on the first of April and first of October. The first of April of this year (1864) found us with a limited supply of milk from the country, and the prices not in proportion to those of other articles of family consumption. The producers were unwilling to fix on any price for the season, consequently the price remained the same as it had been during the winter,

viz: at wholesale, eight-quart cans 38 to 45 cents, and at retail 6 cents per quart.

During the months of April, May, and June, with an increased demand, the supply gradually diminished. In July and August, owing to the prevalent drought, and consequent scarcity of milk, and the high price obtained for butter and cheese, farmers were not disposed to sell their milk freely to the dealers at former rates, and the latter were therefore compelled to seek a portion of their supply in quarters hitherto unvisited, thus incurring additional expense, and of course being forced to raise the selling price to consumers.

Thus the month of September passed, with the general retail price at 8 cents per quart, and during this month it became evident that to obtain a supply for the winter, still another advance must be made.

On the first of October, a general feeling seemed to pervade the minds of milk producers, that if they raised milk for our market, they must be more liberally paid than ever before.

The winter price varied from 45 to 55 cents per can. By a large number of our milkmen this price is paid at the farmer's door, and this amount, with the cost of collecting, transportation, and delivery at the doors of our citizens, accounts for, if it does not justify the high price of milk at 10 cents per quart. Those high rates, however, caused many of the small shops and retail places to relinquish the sale of milk, and has considerably reduced the demand in all parts of the city during the winter.

There are three ways by which the milk is obtained for the supply of this city. First, by men who reside in the neighboring towns, many of them keeping a few cows, and procuring the balance of milk required to supply their customers directly from their neighbors, which they collect at night, preparatory to an early delivery in the city. A large proportion of this is received in private families, and is generally of good quality, and free from adulteration.

The direct manner in which it is obtained, precludes any adulteration except by the producer or the milkman.

The latter, feeling that he is in some measure responsible to his customers for the quality of the milk, is ever watchful of the former.

Second, at least one thousand cans are daily received into this city by a certain railroad, one car being specially appropriated for this purpose, and hired by the milkmen who contract directly with the farmers for their supply of milk. They hire an agent in the country to collect it and forward the same to them. If this milk is not in good condition when received at the depot, it is often returned with a note to their agent, if milk is plenty; if not, a reduction is made in the price according to to the quality of the milk. A portion from this source is used in private families, and not a little distributed to stores and shops in all parts of the city.

Third, another class of milkmen labor under many disadvantages to which the others are not subject. Their milk is received by railroad from the country in two of our neighboring cities, there sold and delivered to the milkmen by milk agents, who contract with the farmers for their supply.

The former employs other agents to collect the same, and these agencies not only add to the cost, but lessen the responsibility in regard to the quality of the milk.

During this year of scarcity, much complaint has been made by the milkmen, that the milk was badly adulterated when received at the depot.

To any remonstrances on the part of the milkmen, on this account, the same answer is made by the agents that is so often made by the milkmen themselves to their customers, viz: "*It's just as I get it, if it don't suit you, leave it.*" All will appreciate the dilemma of the milkman. If he does receive the milk, and delivers it to his customers he is at once discharged for furnishing adulterated milk, receives an unpleasant note from the Inspector, and is truly fortunate if he does not receive one from

the Superior Court also. If he refuses to take the milk, his customers are disappointed, and bestow their patronage upon some other dealer.

I have no doubt that one or more complaints have been made during the past year against milkmen who have passed through the courts, and paid their fine and costs under the above circumstances, they not daring to make complaint themselves against the person of whom the adulterated milk is obtained, well knowing that their whole supply would be stopped and their business destroyed.

Have these men no redress? The Legislature says that all cities *shall* appoint one or more Milk Inspectors, who shall be sworn to prosecute all violations of law in the sale of adulterated milk, coming to their knowledge.

Are not those cities who refuse or neglect to appoint, liable to indictment? From whatever source the adulterated milk may originate, it is but poor consolation for the widow, with a family of small children, who pays 10 cents per quart for milk, if she ventures to complain that it is half water to be told, "*It's just as I get it.*"

The very high ratio of mortality among children in all large cities is a fact familiar to all. And, though many causes may combine to produce this result, yet, long continued and careful observations have satisfied medical men that, among them, none are more prolific of evil, than the defective and irregular supplies of pure milk.

The necessity of a pure and healthy nutriment for infants cannot be too much insisted upon.

As an article of food, under all circumstances of life, in infancy and in age, in sickness and in health, pure milk is a luxury and a prime necessity; and it is remarkable that, of all the varieties of man's subsistence, it should be the most easily decomposed by the operation of causes within itself, and this not so much from the influence of the atmosphere, or any other external agent upon it, as from its own natural elements, arising

from its complicated and peculiar organization; a few hours, and, in warm weather, even a few minutes, being sufficient to change its constituent character.

The following remarks from the *Boston Medical and Surgical Journal* of February 26, 1863, by Dr. White, the chemist employed by your Inspector, illustrate the necessity of a supply of pure milk in a large city: —

"Next to good water, there is no article of daily consumption of more importance to a community than a sufficient supply of pure milk. It is equally a luxury and a necessity, for, containing, as it alone does, in a fluid form, all the elements essential to the daily wants of the human system, it not only enters into the composition of a large proportion of the dishes which form our daily food, but, at certain stages of life, and in some diseases, both of infancy and adult age, it is the only means, in fact, of continuing individual existence. With its rich golden *oil*, its *sugar*, sweet but not insipid, its casein stored with *nitrogen* for the tissues, its *salts*, so carefully selected for our bony frames, and its water of dilution, so necessary for the catalytic processes of life, it comes to us all ready to supply strength to the starved blood, and to circulate, unaided and almost unchanged within us, at times when our organs are either too newly formed and tender, or else too tired or too much abused to undertake the task of extracting from crude materials, sufficient supplies of the above indispensable elements for the continuance of life.

To many a poor child, living through the summer heats in the city, in haunts of cholera infantum, it brings as it were, the essence of sweet meadows and breezy pastures, so full of new life to such little patients.

The rich may have it pure in town, or go seek it in the country; but to the poor, both are alike impossible, and hence many women become mothers, only to see their half-nourished offspring struggle through a few months of a miserable existence, to die at last, merely from the want of an abundant diet of pure milk. During the past two summers more than 500 children

have died of cholera infantum in this city, nearly all of whom, under more favorable circumstances of residence and food, might have been saved to the community.

How often is the physician's advice to the poor mother to wean her infant, met by the question, 'How can I be sure of getting good milk for it?' Without this supply the child cannot be reared, and yet, we are sorry to be obliged to say it, the chances are against her obtaining it from the sources to which she will apply, considering the numerous hands through which it passes on its way from the country to the consumer.

First, the cow, in whom at least there is no deceit, gives down her unadulterated fragrant secretion to the milkmaid's (too often, in these days, of the masculine sex) fingers; then the farmer sells it to the collector, who delivers it to the milk agent, who brings it upon the milk-train to Boston, of whom the milkman, buying a certain number of cans, sells in turn from his wagon to the retail dealer, to whom, finally our poor Irish wife resorts for her daily pint. There are, as we shall see, more direct channels than this, but they do not flow through her section of the city. Until all men learn to become honest, it is apparent then that water, so long as it remains at its present remunerative price, may gain access to the cans, even more than once, before it finally reaches the consumer, and until that time it becomes necessary for the law to protect the sick and the ignorant, both against mercenary thoughtlessness and reckless depravity.

When we consider, therefore, the extent of the traffic, the number of persons through whose hands it passes, each of whom expects to realize a profit from the next party, the character of some of those engaged in the business, the deficient supply at certain seasons, the cheapness and abundance of water, its ready power of mingling with milk, and the difficulty of detecting its presence there by any simple process, it will be easily understood how a specimen may be watered three or four times between the udder of the cow and the mouth that drinks it.

There are undoubtedly as many honest dealers in this as in any other business of a liquid nature, but we fear that the consciences of very many of them are gauged below the standard of a mere pint of water to the can, especially when the supply does not hold out. We believe that, as a rule, the farmers sell good milk, but there is always a suspicion that milk which has already paid three or four profits, and is then offered for sale at retail for four cents a quart, will be found to contain a larger proportion of water than nature ever intended it should. We have heard the excuse offered, that as long as water only is added, and the price thus is brought within the reach of the poor, no great harm is done, and undoubtedly many parties act thus without thinking themselves guilty of any great offence; but it would certainly be more economical for the poor woman to pay a cent or two more for pure milk, and add her water at pleasure afterwards.

There are other considerations, however. Nature always manufactures her fluids in accordance with the most approved rules of chemistry, and any attempts to improve upon her generally cause trouble. Milk is a very complex substance, and at best requires delicate attention to preserve it as such, even for a short time, so that any disturbance of the equilibrium existing between the relative proportions of its elements, hastens those chemical processes which generate lactic acid, or, in other words, convert it into sour milk.

Milk adulterated with water, therefore, is milk no longer; and although the agent thus employed is by itself harmless, its use in this way is none the less a grave offence both against the health and the pocket of the community.

Adulteration, as practised in Boston and vicinity, consists generally in the addition of water alone, although not unfrequently a little burnt sugar is added to restore the color, and common salt to bring up the specific gravity of the specimen to the normal standard. In one instance only have we found any solid foreign substance, and in that case corn starch was used to

thicken and color the specimen. The cases which are complained of are found to contain in 100 parts from 20 to 50 measures of water intentionally added. In one instance only have we found the water of adulteration to exceed this proportion, and almost always analysis shows that there is a standard system adopted by such dealers, and that such specimens contain either 25, 33, or 50 per cent of water, and there is no doubt that the prices are arranged between the dealers accordingly.

We have thus endeavored to place before the public eye the frauds practised in the milk trade, and the amount of protection afforded by the present law. There is a plain duty for the Legislature, the city, and the individual to perform. The former should enact a law which shall make the path of the prosecuting officer easier, and of the fraudulent dealer harder: the city should enforce a more stringent ordinance, and refuse a license to every person twice found *carrying* adulterated milk; and every citizen should insist upon and aid in the enforcement of measures so important to the public health.

The cows which are kept within the environs of some of our large cities, and on which the citizens chiefly depend, are subject generally to so much confinement, and fed to so great an extent with unwholesome food, that both the cows and the milk become diseased and impure, even when no adulteration is resorted to by the dealers; this remark, however, is not applicable to this vicinity, as only a small portion of the milk consumed in Boston is produced in its immediate neighborhood.

In the discharge of my duties I often find mothers of young infants who are deprived of milk from the breast, and who are found incapable of being nourished on such milk as is usually furnished in the city. Thus situated, many endeavor to obtain a portion of 'one cow's milk.'"

"In the majority of instances in which children are brought up by hand, cow's milk is used, as being the most easily procured. When cow's milk is given, it should be borne in mind that it contains more casein than human milk, and less sugar; and it

is, therefore, necessary that it should be given in a diluted state, and slightly sweetened; the degree of dilution should vary according to the infant's age. At first the milk may be mixed with an equal quantity of water, but as the child grows older, the proportion of water may be reduced to one third, or even one quarter. Attention should be paid to the temperature of the food when given to the infant, which ought to be as nearly as possible the same as that of the mother's milk, namely, from 90 to 95 Fahrenheit; and in all cases in which great care is needed, a thermometer should be employed, in order to insure the food being always given at the same temperature.

Human milk is alkaline; and even if kept for a considerable time, it shows but little tendency to become sour. The milk of animals in perfect health, likewise invariably presents an alkaline reaction, and that of cows when at grass forms no exception to this rule. Comparatively slight causes, however, exert a marked influence upon the milk of a cow in this respect; and if the animal be shut up and stall fed, its milk almost constantly assumes a strongly acid property, a fact, which of itself, is sufficient to account for the symptoms of intestinal disorder so often produced by it in the case of children brought up in large cities. There seems to be good reason for believing that the milk of stall-fed cows often undergoes a deterioration much more serious than the merely becoming acid; and that changes not unfrequently take place in it, such as must render it wholly unfit for an infant's food, and calculated only to produce disease." *

Whenever, therefore, the attempt is made to rear an infant by hand, under circumstances which render it impossible to obtain pure, fresh milk from a reliable source, a preparation known as solidified milk, or the condensed milk, (prepared by the Lewis Brothers of this city) is specially adapted to children in our large cities, and on analysis, is found to consist entirely of a perfectly

* Dr. West, on the Diseases and Food of Children.

pure milk. A sample of the solidified milk dried and granulated, was analyzed by the late Chas. T. Carney, Esq., Chemist. He says, "I find on analysis it consists entirely of a perfectly pure milk, simply deprived of water, and that the only addition is a certain portion of sugar; and I consider it infinitely superior in purity and nutriment to the milk generally sold in cities; it is an admirable food for infants, owing to the sugar it contains being more readily digested than ordinary milk."

In closing this Report, your Inspector deems it proper to bear testimony to the kind and efficient coöperation of the District Attorney and the other officers of the courts. Their efforts have greatly contributed to the successful enforcement of the law, and consequently to the advantage of the public. To Dr. James C. White, Chemist, whose analyses of milk have been relied on in the trial of cases arising under the milk law, your Inspector would acknowledge his own obligations for prompt and skilful assistance.

This office during the past year has often been visited by officials from other cities, and letters have been received from remote parts of the country, for information in regard to the milk law of this State and for general information in regard to the inspection of milk, and the punishment for a violation of the law regulating its sale.

In some measure to answer the above inquiries, your Inspector has thought it not improper to incorporate the law as passed by the Legislature of 1864, in this Report.

Respectfully submitted.

HENRY FAXON, *Inspector.*

AN ACT IN RELATION TO THE SALE AND INSPECTION OF MILK.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows: —

SECTION 1. The Mayor and Aldermen of cities shall, and the Selectmen of towns may, annually appoint one or more persons to be Inspectors of milk for their respective places, who shall, before entering upon the duties of their office, be sworn. Each Inspector shall give notice of his appointment by publishing the same two weeks in a newspaper, published in his city or town; or, if no newspaper is published therein, by posting up such notice in two or more public places in such city or town.

SECT. 2. The Inspectors shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They may enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof and cause the same to be analyzed or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence, and a certificate of such result, sworn to by the analyzer, shall be admissible in evidence in all prosecutions under this act. The Inspector shall

receive such compensation as the Mayor and Aldermen or Selectmen shall determine.

SECT. 3. All measures, cans, or other vessels used in the sale or buying at wholesale of milk, shall be annually sealed by the sealer of weights and measures, by wine measure; and all cans so used shall be marked by the sealer with figures, showing the quantity which they hold.

SECT. 4. Whoever neglects to cause his name and place of business to be recorded in the Inspector's books, and his name legibly placed upon all carriages used by him in the conveyance of milk, before engaging in the sale thereof; and whoever sells or buys at wholesale milk by any other measures, cans, or vessels than those sealed, as before provided, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence fifty dollars. And whoever offers for sale milk produced from cows fed upon the refuse of distilleries or any substance deleterious to the quality of the milk; or, whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first, and fifty dollars for every subsequent offence. Whoever sells, or keeps, or offers for sale adulterated milk, or milk to which water or any foreign substance has been added, shall, for the first offence, be punished by a fine of twenty dollars, and for a second offence by a fine of fifty dollars, and for any subsequent violation he shall be imprisoned in the House of Correction not less than thirty, nor more than ninety days. And whoever, in the employment of another, knowingly violates any provision of this Section, shall be held equally guilty with the principal, and suffer the same penalty.

SECT. 5. It shall be the duty of the Inspector to cause the name and place of business of all persons convicted under the preceding section, to be published in two newspapers, printed in the town or county where the offence may have been committed.

SECT. 6. All acts and parts of acts inconsistent herewith, are hereby repealed.

House of Representatives, March 25, 1864.
Passed to be enacted.

ALEXANDER H. BULLOCK, *Speaker.*

In Senate, March 26, 1864,
Passed to be enacted.

J. E. FIELD, *President.*

March 30, 1864,
Approved,

JOHN A. ANDREW.

City Document.—No. 49.

CITY OF BOSTON.

SEVENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1866.

In Board of Aldermen, April 2, 1866.

Laid on the table, and ordered to be printed.

Attest: S. F. McCLEARY, *City Clerk.*

CITY OF BOSTON.

To His Honor the Mayor and Aldermen of the City of Boston: —

Gentlemen: The undersigned respectfully submits the following Report, from March 31, 1865, to March 31, 1866, inclusive: —

The milk trade of Boston is divided into two classes, for which separate sets of Books are kept at the office of the Inspector of milk.

Wholesale dealers are those who distribute to families, stores, &c., from carriages; and those persons who keep more than one cow in the City proper, South and East Boston, are classed with Wholesale dealers.

Retail dealers are those who sell in small quantities from market-places, stores, shops, and cellars.

Number of cows kept within the limits of the City of Boston,	297
Viz: No. in the City proper,	45
" at South Boston,	131
" at East Boston,	121
" of persons who keep but one cow,	82
There have been recorded the names and places of business of wholesale dealers in milk since last Report	63

Whole number of wholesale dealers registered to date,	739
Whole number of wholesale dealers now in the business,	256
Whole number of wholesale dealers now selling from carriages,	206
Whole number of small wholesale dealers, who keep more than one cow, and sell to the neighborhood,	50
Number of retail dealers in milk recorded since last Report,	126
Whole number of retail dealers in milk recorded to date,	2,086
Number of cases of milk Inspected since last Report,	1,530
Number of cases analyzed by Chemist,	20
With the average amount of adulteration,	32.73$\frac{7}{10}$
Largest amount of adulteration (water intentionally added in 100 parts),	51.17
Least amount of adulteration, water added,	18.61
Number of cases pending in the Superior and Supreme Court at the date of last Report,	8
In all of which convictions were obtained, and fines paid.	
Number of complaints in the Cambridge Police Court,	1
And the defendant discharged.	
Number of complaints in the Boston Police Court,	3
" convicted in the Police Court,	3
" of complaints made to the Grand Jury,	12
" of bills of Indictment by the Grand Jury,	12
" of cases convicted in the Superior Court,	9
" of cases discharged by the Superior Court, Indictment quashed,	1
" " appealed to Supreme Court,	0
" " now pending in the Superior Court,	2

Number of gallons for daily supply of milk for the city of Boston	16,129
Daily cost to consumers	$ 5,483 86
Number of gallons for supply one year	5,887,085
Cost to the consumers one year	$ 2,001,608 90

During the past as in former years my duties as Inspector of milk have required all my time and attention, and the records of this year will compare favorably with those of former years. Much has been done in a quiet way to keep in check those violations of law for which the office was instituted.

The contracts for the supply of milk are generally made twice a year, viz: on the first of April and first of October.

The first of April of last year (1865), found us with a good supply of milk from the country, which at the depot, after collecting and transportation, cost the milkmen fifty cents per can. This reduction from the previous winter price enabled them to retail to families at eight cents per quart, and wholesale to stores and shops from sixty-two to sixty-five cents per can.

During the months of April, May, and June, the milk in all parts of the city was quite plenty and in general free from adulteration. In July, August, and to the middle of September, although the demand was great for milk, the supply was nearly equal.

Then, owing to the prevalent drought and other causes, the supply gradually diminished, so that the milk agents were compelled to extend their routes, and seek a portion of their supply in quarters hitherto unvisited, thus incurring additional expense, and of course being forced to raise the selling price to consumers.

On the first of October the retail price was advanced to nine cents per quart and at wholesale in proportion.

Unusual means were resorted to by some of the milkmen, to enable them to retain their customers with their limited supply of milk; and to enable them so to do, the condensed milk was

used to a considerable extent with the original quantity of water restored (and oftentimes more) and this mixed with their small supply of fresh milk from the country enabled them in some measure to satisfy their customers as to the quantity, if not the quality, of the milk.

Even in these times of scarcity, but few people are willing to submit to a small allowance; and their daily cry to the milkmen is, "more milk."

It would be much better to take a smaller portion from the milkmen, and increase the quantity by the addition of water themselves, than to trust the milkmen or agents to do it for them.

From about the middle of September to the fifteenth of December this scarcity of milk continued, and some of the milkmen were obliged to abandon the business for want of milk to supply their customers; and others more fortunate would condescend to sell to those in the trade a few cans at an enormous price.

In this short season of scarcity, much complaint was made by the milkmen, that the milk was badly adulterated when received at the depot; and cans have been brought direct to this office and found not only greatly extended by water but entirely destitute of cream. In one instance this adulteration continued for a considerable length of time; and as the milk was sent here for the use of our citizens, I felt it my duty to remonstrate by entering a complaint in one of neighboring counties against the offending parties; thus creating considerable excitement, which proved in the end greatly to our advantage.

There is no doubt that a considerable quantity of our usual autumn supply of milk was retained in the country for the purpose of making butter, which is not done to any great extent during the cold weather; so that a few cold days about the middle of December, wrought a wonderful and immediate change, which enabled the milk dealers to satisfy the demands of all their customers as regards quantity; but during the

winter months, in some sections of the country, the supply exceeded the immediate demand, and the oldest milk was first forwarded for consumption; so that when received by some of our families it was from two to four days' old, and even though immediately placed on ice, was in a few hours found to be unfit for use.

Notwithstanding the short season of scarcity, and the high price of milk, the consumption this year has been larger than that of any previous year; and, if we except the three fall months, the amount of adulteration, much less.

Massachusetts, and to some extent New Hampshire, and Maine, are called upon to assist in the supply of milk for Boston, and the neighboring cities.

It is estimated that ten thousand cows are required for the supply of the city of Boston alone; and the price of good milch cows has more than doubled within a few years. The present real scarcity of beef cattle, — which we have only begun to feel, — and the prospect of still higher prices, may well call attention to the sources and means of supply.

Many of our families, especially of the poorer class, feel disposed to complain at the advanced price of milk.

The price paid the last year cannot be considered out of proportion to other articles of family consumption. One quart of good milk, which costs eight cents, for a family of children, affords more nourishment than the same money would procure expended in any other way.

The number of persons convicted during this year — with their names and places of business made public in the daily papers — has brought to the notice of our citizens more frequently the subject of adulterated milk; and my services in private families have been more often required than in any previous year. In many of these cases, howmuchsoever the milk may be found adulterated, the parties are unwilling to appear in court, and prefer to discharge the milkman, from whom the milk is obtained. In some instances, this losing a good customer is of more importance to a dealer than a complaint in court.

In more than one family, however, where the offender has been convicted, his soothing persistency to retain its custom has more weight than the adulterated milk, the conviction, and the influence of the Inspector, combined.

All places within the city limits where milk is sold have been visited, and the milk inspected since the date of my last Report, and some of these places have required frequent attention.

Your Inspector has endeavored not to cause the analysis of any sample of milk unless the amount of adulteration was sufficiently large to justify a complaint in court without any doubt as to a conviction.

The Act regulating the sale and inspection of milk passed by the Legislature and approved March 30, 1864, has, after another year's experience, proved the value of its amendments and enabled the prosecuting officers to bring this class of cases before the courts with greater certainty of success.

At the close of my last year's Report there were two more milk cases pending in the Supreme Court, and a number of others awaiting those decisions, the result of which has been not only to sustain the law, but greatly to encourage all persons interested in its enforcement. The good result of those decisions has been plainly seen and felt in the number of offending parties pleading guilty and paying fine and cost, without the risk of a trial.

To the prosecuting attorneys and officers of the courts, I tender my hearty thanks for their prompt and earnest endeavors to secure the conviction of offenders against the law regulating the sale of milk.

I also feel obliged especially to mention the valuable services rendered by Dr. James C. White, Chemist, whose analyses of milk have been relied on in the trial of cases arising under the milk law, and for the personal kindness and courtesy that have marked the intercourse of the year.

Respectfully submitted,

HENRY FAXON, *Inspector.*

With the Respects of Henry Jones
6357.60

City Document. — *No.* 40.

CITY OF BOSTON.



EIGHTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1867.

In Board of Aldermen, April 1, 1867.

Laid on the table, and ordered to be printed.

Attest:

S. F. McCLEARY, *City Clerk.*

CITY OF BOSTON.

To his Honor the Mayor, and Aldermen of the City of Boston :

GENTLEMEN: The undersigned respectfully submits the following Report, from March 31, 1866, to March 31, 1867, inclusive.

The milk trade of Boston is divided into two classes, for which separate sets of Books are kept at the office of the Inspector of Milk.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those persons who keep more than one cow in the city proper, (South and East Boston are included.) Retail dealers are those who sell in small quantites from market-places, stores, shops, and cellars.

Number of cows kept within the limits of the City of Boston	301
Viz: No. in the City proper	46
" at South Boston	132
" at East Boston	123
" of persons who keep but one cow	85
There have been recorded the names and place of business of wholesale dealers in milk, since last Report	46
Whole number of wholesale dealers registered to date,	785
Whole number of wholesale dealers now in the business	260

Whole number of wholesale dealers now selling from carriages	203
Whole number of small wholesale dealers, who keep more than one cow, and sell to the neighborhood	57
Number of retail dealers in milk recorded since last report	164
Whole number of retail dealers in milk recorded to date	2,250
Number of samples of milk inspected since last report	1,581
Number of cases analyzed by chemist	30
With average amount of adulteration	31.40
Largest amount of adulteration—water intentionally added in 100 parts	51.17
Least amount of adulteration — water added	6.98
Number of cases pending in the Superior Court at the date of last report	2
In which convictions were obtained and fines paid	0
Number of complaints in the Cambridge Police Court	2
Number convicted in the Cambridge Police Court	2
Number of complaints in the Boston Police Court	1
" convicted in the Boston Police Court	1
" of complaints in the Municipal Court	4
" convicted in the Municipal Court	4
" of complaints to the Grand Jury	16
" of bills of indictment by the Grand Jury	16
" of cases convicted in the Superior Court	16
" of gallons for daily supply of milk for the City of Boston	17,125
Daily cost to consumers	$5,822 50
Number of gallons for supply one year	6,250,625
Cost to consumers one year	$2,125,212 50

At the close of another year, as Inspector of Milk, I take pleasure in laying before you the following Report:

The office in this city was established Aug. 10, 1859. At that time, and for two or three years previous thereto, but little interest on the part of our citizens was manifested; but later years have increased its importance, not only to our own people, but also to those of other States, cities and towns, who frequently avail themselves of our experience. Strangers from other large cities, and from abroad, have always expressed much interest in visiting this office.

The office would be more useful to a large class of our own citizens were it more generally known that no compensation in any form whatever is received for advice or services rendered.

The contracts for the supply of milk between the producers and the milk dealers are generally made twice a year, viz: on the first of April and first of October.

The first of April of the year 1866 found us with a good supply of milk from the country, which, at the depot, after collection and transportation, cost the milkmen fifty cents per can of eight quarts. The country milkmen, who obtain their supply direct from the farmers at their own doors, pay forty-five cents, and both parties retail to their customers at eight cents per quart, and sell by wholesale to stores and shops at rates from fifty-six to sixty-five cents per can.

The month of May was dry for the season; the milk continued plenty, and, by inspection in all parts of the city, proved unusually free from adulteration; and large quantities of the old surplus milk was sold to parties at a reduced price, for the purpose of being made into butter, — which business, in some parts of the city, when milk is plenty, is carried on quite extensively.

During the month of June, and especially towards the latter part, the weather was extremely hot and dry, so that even a few

days wrought a great change in the increased demand and limited supply of milk. During my visits of inspection, I found that many of the small places in various parts of the city, where milk was formerly sold, had abandoned the sale of milk, in consequence of their being prohibited the sale of *liquor*, the profit derived on the sale of the former being too small for an independent business. Again, in the central part of the city, the shops and cellars, where large quantities were sold, have been removed to make room for extensive improvements. It was also found by vendors at South and East Boston that in many places the small profit derived by the sale of milk would not enable them to obtain *ice* at the exorbitant price demanded, so that in a few hours after being left, the milk would be unfit for use.

The first part of July being very warm, brought an increased demand for milk. Many of the dealers lost large quantities by the extreme heat and sudden changes of the weather.

The milk agents were compelled to extend their routes to a greater distance into the country, and seek a portion of their supply in places hitherto unvisited.

The latter part of the month brought cool weather, with frequent showers, and the supply of milk was equal to the demand, which continued through the months of August and September, giving us a fair and reasonable milk trade.

On the first of October, the winter contracts for milk commenced, which enabled the milkmen to sell the eight-quart cans to stores and shops for sixty-two cents, and the large cans, which hold one quart and a pint more, for seventy cents per can, and the general retail price to families at nine cents per quart.

November. The first part of this month the pastures and fields afforded food and nourishment for cows nearly equal to the amount in the summer months, so that milk continued plenty with about the usual demand, and the average standard by inspection in various parts of the city exhibited much less

adulteration than the corresponding month of last year, if we except a few days at the last of the month, when storms and cold weather wrought quite a sudden change in the supply from the country, and the annual Thanksgiving served still further to increase the demand, so that many of the milkmen could not obtain a sufficient supply to answer the wants of their customers without extending it by the addition of water; and I found that the consciences of some allowed them to extend it below the standard of three quarts to the can, when at the same time they would doubtless have denounced any grocer who sanded his sugar or watered his molasses as a subject worthy of the House of Correction.

December. The milk trade, always subject to the sudden changes of the season and weather, this month enabled the milk dealers again to meet the demands of their customers, which continued through the months of January, February and March, if we except a short time about the middle of January, when a violent snow-storm greatly obstructed the travel and blockaded the sources of supply from the country, so that only a limited quantity was received in some families, many others being left entirely destitute of milk for some days.

All places within the city limits where milk is sold have been visited, and the milk inspected, since the date of my last report, and some of these have required frequent attention. A record of all samples inspected is made in the books of this office.

In private families, when my services have been required for the inspection of milk, I have promptly answered every call. The number of these has been much more frequent than in any previous year, and in each case I have continued my visits and taken such measures as to secure an improvement to the satisfaction of those interested, often exposing the gross imposition practised by some of the milkmen, in pretending to furnish "*the one cow's milk*," as prescribed by the family physician for feeble or drooping children. Parents are ever ready to avail

themselves of every hope, and the milkman is accordingly entreated to obtain the required nourishment; of course, an additional price is asked, and is freely given. Many times the milk thus left, on inspection, has proved inferior, and more extended, by the addition of water, than the usual daily supply for the family.

In the month of November, by request, I visited a family in this city a number of times in regard to the milk. The lady informed me that her child was sick and teething. By advice of her physician, she had taken pains to secure the milk from *one cow;* it was brought in small cans by itself, for which an extra price was paid. I received the cans as left by the milkman, and on inspection found that they contained at least one-quarter part added water, and that his general practice was, to fill these small cans from some of the larger ones, at the door. Again, in December, one of these milk-and-water men was before the Superior Court for selling adulterated milk. A gentleman present, hearing the name of his own milkman called, turned round to see if there was not some mistake, and heard him plead guilty of adulterating his milk with more than forty per cent of water. This gentleman at once visited this office to learn all the facts in this case.

His thoughts turned to sad scenes in the family circle, and he was moved to tears, having placed confidence in this man to obtain the *one cow's milk.*

I have felt it my duty in a former report to say that whenever the attempt is made to rear an infant by hand, under circumstances which render it impossible to obtain pure, fresh milk, from a reliable source, a preparation known as solidified milk, or the condensed milk prepared by the Lewis Brothers of this city, is especially adapted to children in our large cities, and on analysis, is found to consist entirely of a perfectly pure milk.

There are many of our milkmen who are honest, and intend to supply their customers with good milk. These especially

require protection from the sale of adulterated milk, but find it difficult to compete with those who constantly undersell, (and there are many such,) as adulteration enables them to do; and all good citizens should be willing to assist in the enforcement of a law intended to benefit all classes of the community, instead of showing a disposition to screen offenders by a reluctance to appear against them in court.

Adulteration of milk, as practised in Boston and vicinity, consists generally in the addition of water alone, although not unfrequently a little burnt sugar is added to restore the color, and common salt to bring up the specific gravity to the normal standard. It is a matter of great importance to the public whether they receive pure milk or pay for two or three cans of water in every eight, with an admixture of sugar and salt.

The *American Agriculturist* for the month of July, contains an able and well studied article, on what constitutes good milk; its adulteration etc. Although written for the neighborhood of London, years of experience on a milk and stock-raising farm and the duties of Inspector for the past seven years, convince me that the article is equally well adapted to the vicinity of Boston.

"The quality of milk is a matter which concerns not only the consumer of the liquid as milk, but also those who make butter and cheese from it.

"Much has been said of late years concerning the reliability of the usual tests for the quality of milk, and the Lactometer has been discarded by many as quite unreliable.

"Doct. Voelcker, chemist to the Royal Agricultural Society of England, has recently published, in the popular *Science Reviewer* a paper upon 'Milk and its Adulteration,' in which he shows that for the purpose of detecting any amount of adulteration that would be profitable, the old method of testing is satisfactory. The article referred to comes from such high authority, and is withal so interesting, that we wish we were able to give

it entire, but must be content with making rather copious extracts.

"'A variety of conditions affect materially the quantity and quality of milk . . . Thus the season of the year, and the amount and kind of food given to cows, influence the yield and quantity of their milk; again, the race or breed, and size of the animal, to a great extent, affect this yield and quality. Generally speaking, small races, or small individuals of the larger races, give the richest milk, from the same kind of food. Where good quality is the main object, Alderneys or Guernseys unquestionably are the cows that ought to be kept, for they give a richer cream than any other kind in common use in this country; but of course Alderneys are not the most profitable stock for cow-keepers in towns, with whom the Yorkshire cow, essentially a short horn, is the favorite breed, as it surpasses all others for the quantity of milk it yields.

"'The milk, however, compared with that of the Alderney or Ayrshire cow, is more watery and less rich in butter, and therefore not well suited for dairies in which butter and cheese are made.

"'In the spring of the year, and the early part of summer, milk is more abundant, and the butter made from it of a finer flavor. As the season advances, the supply diminishes, but becomes richer in butter. The influence of food on the quality of milk is very striking. A half-starved cow not only yields but little milk, but what it yields is miserably poor. On the other hand, the liberal supply of food, rich in nitrogenous and phosphatic elements of nutrition, tells directly on the milk.

"'Nothing, therefore, can be more injudicious than to stint dairy cows in food.

"'The finest flavored milk and butter, I need hardly say, are produced by cows fed in summer entirely on the grass of rich, permanent pastures, and in winter on nothing else but hay made of fine, short, sweet grass. Eleven or twelve pounds of grass

produce about one pound of milk, or a ton of good hay produces, as nearly as possible, one hundred gallons of milk. Few persons, however, having the opportunity of keeping cows for their own use, can afford to feed them entirely in winter upon hay. Turnips, marigolds, meal, brewer's grain, bran or oil-cake, with more or less cut straw, in a great measure have to take the place of hay as a winter food.

"'Turnips give a disagreeable taste to the milk, and moreover produce very watery milk.

"'Marigolds are less objectionable, but should not be given to milch cows without an allowance of three to five pounds of meal. Of all kinds of meal, none is equal in milk-producing qualities to bean-meal, — a fact which finds a ready explanation in the circumstance that bean-meal contains as much as twenty-eight per cent of flesh-forming matters, or the same class of compounds to which the curd and albumen of milk belong, and that it is also rich in phosphates, or bone earth. Pea-meal or Egyptian lentils closely resemble bean-meal in composition, and may be used with equal advantage as an auxiliary and excellent food for milch cows. It is not a little remarkable that in leguminous seeds, which are always rich in flesh-forming matters, as well as in other articles of food, a large percentage of nitrogenous or flesh-forming compounds usually is associated with a large percentage of phosphates or bone-earth. There exists thus naturally an admirable provision in food, especially adapted for milch-cows or young and growing stock, to supply the animal not only with the material of which the curd of milk, or the flesh of young stock consists, but likewise to supply bone materials, for which there is great demand when growing stock has to be maintained in a thriving state, or cows have to be kept in a condition in which they may be expected to yield much and good milk. Oil-cake produces much and rich milk, but seriously injures its quality by giving it a bad flavor.

"'Bran, on the other hand, is a good food for milk. Indeed,

nothing can be better as an auxilliary winter food for milch cows than four pounds of bran made into a thin mash, to which should be added four pounds of bean-meal. Along with this about twenty-five pounds of marigolds, and about fifteen pounds of hay, and fifteen of straw-chaff, should be given per day to each cow.

"'Cows fed upon such a daily allowance of bran, bean-meal, marigolds, hay, and straw-chaff, during the winter months, yield much more milk of a superior flavor than cows fed upon turnips and most other kinds of auxiliary food.

"'When brewer's grains can be obtained at a reasonable price, they will be found one of the cheapest and best foods that can be given to milch cows. Brewer's grains, I find, are much more nutritious than their appearance seems to warrant. Even in the wet condition in which grains are obtained from breweries, a condition in which they hold from 75 to 77 per cent of water, they contain a good deal of ready-made fat and flesh-forming matters. When air-dry, brewer's grains, I have recently discovered contain from 7 to 8 per cent of oil and fatty matter, and in round numbers 15 per cent of nitrogenous matters, and in this state are more nutritious and a more useful food for milch cows than barley-meal in the same state of dryness. . . .

"'A very good judgment of the quality of milk may be formed from the amount of butter which it yields on churning, or from the amount of cream which it throws up on standing.

"'Instruments, adapted for measuring the quality of cream thrown up by different samples of milk, are called Creamometers. These instruments are simply graduated glass tubes, divided into one hundred equal degrees, in which milk is poured up to the division marked 0, and is kept at rest for twelve hours.

"'Although the creamometer does not furnish results which correctly represent the real amount of butter in different samples, it nevertheless affords a ready means of ascertaining whether

milk is rich or unusually poor in butter; in other words, whether or not milk has been skimmed to a considerable extent. Good milk, of average quality, containing from ten and a half to eleven per cent of dry matter, and about two and a half per cent of pure fat, yields from nine to ten per cent of cream. Naturally poor milk containing ninety or more per cent of water, and less than two per cent of pure fat, yields only six to eight per cent of cream, or even less.

"'Experiments on a large scale have shown me that the thickest cream does, by no means, give the most butter, and that the cream which rises from different kinds of milk often varies greatly in composition. The indications of the creamometer therefore, are fallible when samples of milk, produced under very different circumstances, have to be tested. Milk sent by rail is necessarily subject to a good deal of agitation, and throws up less cream than that which has been less disturbed.

"'A great deal has been said and written about milk adulteration. Sheep's brains, starch paste, chalk, and other white substances, which are said — on what authority nobody has ever decided — to have been found in milk, only exist in the imagination of credulous or half-informed men. It is difficult to understand where all the sheep's brains should come from, and how they could be amalgamated with milk, nor is it at all likely that chalk, a substance insoluble in water, and not easily kept in suspension, should be employed for adulterating milk.

"'As a matter of fact, I may state that I have examined many hundreds of samples of milk, and never found any chalk, nor any adulterating material except an extra quantity of water, and I never met as yet with a chemist who has found any of the clumsy adulterations which popular treatises on food describe as having been detected in milk.

"'The whole question of milk adulteration and means of detecting it, resolves itself into an inquiry into the character of good, bad, and watered or skimmed milk, and the mode of

recognizing these with expedition and precision. . . . A great many experiments have led me to the conclusion that within certain limits the specific gravity is the most trustworthy indicator of quality, and that for all practical purposes an ordinary hydrometer float, by means of which the gravity of liquids can be ascertained with precision, and a graduated glass tube, divided into 100 equal degrees, constitute the safest and readiest means for ascertaining the quality of milk, so far as it is affected by the relative proportions of the normal milk constituents.

"'A set of such instruments or lactometers, one being a graduated glass tube for measuring the proportion of cream thrown up on standing, and the other a gravity float, or hydrometer, with plain printed directions for use, can be obtained at the cost of a few shillings.

"'A few years ago I made some accurate gravity determinations of pure milk, before and after skimming, and of samples mixed purposely with ten to fifty per cent of water, and as the results may be useful in comparing them with others, I give them in the subjoined table:

"'SPECIFIC GRAVITY OF WATERED MILK.

	Specific gravity at 62 F. before skimming.	Specific gravity at 62 F. after skimming.
Pure Milk	1.0314	1.0337
Ten per cent water	1.0295	1.0308
Twenty per cent water	1.0257	1.0265
Thirty per cent water	1.0233	1.0248
Forty per cent water	1.0190	1.0208
Fifty per cent water	1.0163	1.0175

"'The following analysis of milk from different localities in the richer and poorer districts of London, shows that the amount of cream bears a direct relation to the specific gravity of the milk. The author concludes from his

researches that: These facts afford a conclusive answer to the objection that no dependence can be placed on the gravity test.

"'The fact is cream, though lighter than skimmed milk, is denser than water, and any amount of water worth adding at all, can readily be detected in milk by the direct lowering of its normal specific gravity.'"

In closing this Report, your Inspector would acknowledge the hearty co-operation of the prosecuting attorneys, and the other officers of the Courts. Their efforts have greatly contributed to the successful enforcement of the law, and consequently to the advantage of the public.

I would also return thanks to Dr. James C. White, chemist, employed by this office, who, notwithstanding the many calls upon his time by his professional and official duties elsewhere, has given to the business the most prompt and careful attention.

Respectfully submitted,

HENRY FAXON,

Inspector.

With the Respects of Henry Anton

City Document. — *No.* **45.**

CITY OF BOSTON.



NINTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1868.

In Board of Aldermen, April 6, 1868.

Laid on the table, and ordered to be printed.

Attest:

S. F. McCLEARY,
City Clerk.

CITY OF BOSTON.

To His Honor the Mayor, and Aldermen of the City of Boston.

GENTLEMEN: The undersigned respectfully submits the following report, from March 31st, 1867, to March 31st, 1868, inclusive.

The Milk trade of Boston is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those persons who keep more than one cow, in the city proper, (South and East Boston included.)

Retail dealers are those who sell in small quantities from market-places, stores, shops, and cellars.

The dealers in the southern district have not yet been registered, and are not included in this report.

Number of cows kept within the limits of the City of Boston	263
Viz: No. in the City proper	34
No. at South Boston	105
No. at East Boston	124
No. of persons who keep but one cow	78
There have been recorded the names and place of business of wholesale dealers in milk since last report	79
Whole number of wholesale dealers registered to date	858
Whole number of wholesale dealers now in the business	276
Whole number of wholesale dealers now selling from carriages	208

Whole number of small wholesale dealers who keep more than one cow, and sell to the neighborhood.....68
Number of retailers in milk recorded since last report.....154
Whole number of retail dealers in milk recorded to date.....2404
Number of samples of milk inspected since last report.....1747
Number not adulterated.....1118
Number more or less adulterated.....629
Number of cases analyzed by chemist.....35
Average amount of adulteration.....32.47
Largest amount of adulteration, water intentionally added in 100 parts.....55.82
Least amount of adulteration, water added.....13.96
Number of cases pending in the courts at the date of last report.....0
Number of complaints in Municipal Court.....2
Number convicted in the Municipal Court.....2
Number of complaints to the Grand Jury.....21
Number of bills of indictment by the Grand Jury.....21
Number of cases convicted in the Superior Court.....19
Number of cases now pending in the Superior Court.....2
Number of gallons for *daily* supply of milk for the City of Boston.....17,493
Daily cost to consumers.....$ 5597 76
Number of gallons for supply one year.....6,402,438
Cost to consumers one year.....$2,048,780 16

The expenses of this office have been as follows, viz:

For the analysis of milk.....$280 00
Stationery, Record Books, etc.....31 40
Inspector's small bills for assistance, Lactometer, etc.....24 35

$335 75

For violations of the Milk Law there have been paid in the Municipal and Superior Courts fines and costs amounting to.....$594 47

At the close of another year your Inspector would observe that his whole time and attention have been given to the duties of his office, and the records of this year will show what progress has been made in the objects for which the office was established.

The contracts for the supply of milk are generally made twice a year, viz: on the first of April and the first of October.

The milk cans used for the conveyance and sale of milk by the dealers, are of two classes. The large cans which hold nine quarts and a pint are in general use by the milk trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans which hold eight quarts and one half pint are mostly in use on the Fitchburg, Lowell, and Eastern Railroads, and no milkman is considered equipped for business unless he is the owner of two or three full sets of cans — either eights or nines as above described, sufficient to contain the necessary milk for his daily route; one set being in use, while the others are on their way to the country for a fresh supply. Many of the milkmen, engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers.

The milk during the summer costs at the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-eight cents. This is sold to stores and shops, at from fifty-four to sixty-two cents per can, and is retailed in smaller quantities to families at eight cents per quart.

April, 1867. Commences with a good supply of milk from the country, and about the usual demand in the city. Most of the complaints in regard to the milk, this month, have arisen from its being old and deficient in cream when left in stores and families.

May.— This month, wet. The supply of milk from the country

was abundant, and, by inspection in all parts of the city, proved unusually free from adulteration; and large quantities of the old surplus milk were sold to parties at a reduced price for making butter.

Many families receive their milk from the milkmen, in small cans, in which it is allowed to remain until used, instead of being emptied as it should be, into sweet, clean bowls or pans, which would enable the cream to rise more freely and the milk to keep longer.

June. — Weather cool, with frequent rains. The supply of milk more than equalled the demand, and some new sources were opened during this month, and not a little was sent in from sections of the country hitherto unvisited.

July. — Commenced with warmer weather, and a greater demand for milk. During the middle and latter parts of the month there were frequent showers and long rain storms, and the supply of milk was ample for all demands. Many times during this month the milk depots were visited for the inspection of the milk previous to its removal from the cars. It was found that in a number of cans from different dairies the milk was largely extended by water, and this was returned to the places from whence it came; samples of this milk were analyzed by the chemist, and pronounced unfit for sale.

August. — The first part of this month was cool, with rainstorms, and the supply of milk more than equal to the demand, so that many of the country milkmen, after supplying their regular customers, resorted to the poorer sections of the city to sell their surplus milk at reduced prices. Milk thus sold was often inspected and generally found to be quite free from adulteration, but deficient in cream. During this term the milk was frequently found to be changed and sour, and indeed often so much affected at the time of delivery, as, in a few hours, to be wholly unfit for use, even when immediately placed on ice. The latter part of this month brought an increased demand for milk, and

some dealers found it difficult to supply the demand of their customers.

September. — Was cool and pleasant, favorably affecting this trade so subject to sudden changes. This enabled the milk dealers again to meet the demands of their customers; and from the middle to the last of the month, they had enough and to spare for transient customers on the street at from four to six cents per quart.

November. — Came in moderate and pleasant with good pasturing and an abundant supply of milk up to about the twentieth, when a few cold days wrought quite a sudden deficiency in the country supply, and the approach of Thanksgiving served still further to increase the demand. Some of the dealers, however, aware beforehand of the coming demand at this season, took the precaution to secure a good supply for themselves, and some of them, a surplus to dispose of to their brother milkmen, at a handsome profit.

The demand for extra milk was not so pressing this season as in former years, when the accompaniments of milk were obtained at a greatly reduced price. The middle and latter part of this month were marked by high winds, and a couple of unusually cold days, the mercury descending nearly to zero.

December. — Was very cold and stormy for the season. In general, however, the milk increased from last month, and the supply about equalled the demand; but it was found in stores and shops badly frozen.

During January, February, and March, there was but little demand for an extra quantity of milk. In January and March, two or three violent snow-storms obstructed travel and blockaded the sources of supply from the country. With these exceptions, the milkmen were enabled to supply all demands.

The month of March has generally been the time for establishing the price of milk for the ensuing summer. The milk producers have felt for a long time that they were not sufficiently

paid for their milk, considering the high price of cows and the increased cost of keeping them. The milk agents and collectors say that their margin for profits, after paying for transportation etc., is small: and it may be so; for, even had they the disposition, they have not the opportunity, as have the farmer and the milkman, of skimming or extending the milk, — an opportunity too often improved. So unwilling, however, are too many milkmen, to sacrifice the opportunity for excessive profit, that they often adulterate, apparently without any discrimination or even standard of their own. Consumers, nevertheless, feel that the price of milk, at eight cents per quart, — as during the past year, — is as high as that of any article of family consumption.

During this year the milk producers have associated themselves together and held conventions in this city, with the hopes of increasing the demand for pure, good milk, and advancing the price.

A part of the milkmen, doing business in this city, formed themselves into an association a number of years since, which still continues; the alleged object of which was to avoid soliciting each others' customers for supplying them with milk, and also to obtain their supply of milk from the milk agents at a fixed price, and to equalize and regulate the price with the consumers. Whatever the object of either, or both of these associations may have been, all that our citizens ask is, that they may have good milk, for which they are willing to pay a fair price, leaving all difference of opinion as to profit and loss to be settled by those parties more directly interested.

Milk has ever been considered an excellent, and in many cases, an indispensable article of food. From infancy to age, in the civilized world, pure, sweet milk is a prime necessity, and is considered of such importance that the first object of every agricultural association has been to improve the products of the dairy.

The adulteration of milk within a few years has become of

sufficient importance to require stringent laws and measures to keep in check this great evil. When we consider the fact that pure milk from the cow contains eighty-six per cent of water in one hundred parts, and only fourteen parts of solid matter, we may well pause and look at its adulteration in its true light; and whatever sympathy we may have to spare, let us be sure that it be placed, not on the side of the criminal who adulterates his milk, but on that of his victim, who is first robbed, and then starved by the use of it.

We often hear the excuse offered, that, as long as water only is added, no great harm is done; and undoubtedly many parties act thus without thinking themselves guilty of the great offence it really is.

The present law, after a trial of four years, has proved more efficient than any of its predecessors. Even if it be not perfect, still, all things considered, it serves its purpose as well as could be expected; yet there are certain parties who have never ceased since its enactment, to labor for its repeal or modification to suit their *own views*. These interested persons have besieged the Legislature unremittingly, with demands for a new law or a change; but fortunately without effect, thus far. If it were at all probable that the law would be improved in efficiency by revision, or that a new one would more effectually prevent the evils that exist in the milk trade, we should heartily advocate its change; but we are firm in the opinion that the present law properly enforced is amply equal to the work which it is designed to perform.

During this year sixteen new milk routes have been commenced by parties able to obtain a small supply of milk; and in order to secure customers, they are compelled to sell their milk at a reduced price. Many of them also, to sustain themselves, resort not only to the skimming process, but to extending their milk, apparently without compunction or limitation. The most of these men commence business with very small capital, at a

season when milk is plenty; and as soon as the supply is not equal to the demand, they sell out the few customers thus obtained, and are seen no more.

One hundred and ninety-five samples of milk have been inspected for private families, at their request; and samples have often been received at this office from persons outside the limits of your inspector's district. In many of these cases, adulteration was not the cause of complaint; a little care in feeding, cleansing the cans, and cooling the milk, would have prevented the unpleasant *taste* and *smell*, and saved much trouble.

All places within the city limits where milk is sold, have been visited and the milk inspected, since the date of my last report, and some of these have required frequent attention.

A record of all samples inspected is made in the books of this office.

In general, the milk furnished to private families, by our milkmen, is free from adulteration, but often deficient in cream. The quality of the milk, especially if adulterated, deteriorates with the grade of customers, so that the poorer class, who buy in small quantities, receive the largest amount of adulteration.

A large proportion of our milkmen supply private families exclusively, and your Inspector has yet to learn that it is his duty to intrude his services unsolicited on any private family in regard to the quality of their milk. It is his duty, however, to enter any place where milk is *kept for sale* and to prosecute all violations of law relating thereto. It cannot be denied that there are too many of these places, in the summer season especially, where the milk is either watered or skimmed more or less, or both; and when the former, or both these methods combined are resorted to, they are sure to render the offending parties liable to exposure and prosecution.

More than two hundred samples of milk have been analyzed for the city of Boston, by some of the most able chemists in the country, within a few years, and no adulterating mixtures other

than water, burnt sugar, and salt, have been discovered with two exceptions, in which the substances used were corn starch, and magnesia. *No sheep's brains, chalk, French syrups,* or other chemical substances have ever been detected. And surely, if any person really suspected that milk offered for sale in this city contained such clumsy and expensive adulterations, he might easily satisfy himself that such is not the fact. There can be no profit in the adulteration of milk except to increase the quantity, and any amount of water worth adding at all, can readily be detected in milk by the direct lowering of the specific gravity.

Monday, October 28th. — While on a tour of inspection in the stores and shops at South Boston, a respectably appearing Irish woman present requested that I should accompany her and inspect the milk at her house, as her son was fast wasting away in consumption, and his physician advised that a portion of his diet should consist of pure good milk, which she had endeavored to obtain of her milkman by paying him one cent extra per quart. On inspection, this milk proved that added water had lowered the specific gravity more than five degrees, and the skimming process had not been omitted.

This poor woman, forgetting the situation of her son, commenced the usual excuses, and extenuating circumstances in behalf of her milkman, and resolved to discontinue the taking of his milk for fear of involving him in trouble. At an early hour, however, the following morning the placing near her door a boy with pitcher and a five cent scrip, removed all difficulties, and enabled the inspector to obtain all the milk necessary, which was immediately carried to the chemist, and, on analysis, proved to contain nearly forty per cent of added water in one hundred parts, and less than six per cent of cream. Before the facts in this case became known to the milkman, a second complaint was made against him for selling adulterated milk in a store, and if he does not dispose of his route as others generally do (under similar circumstances) a third complaint will immediately be made against him.

The Patent Office Report of 1861 contains some valuable suggestions on the subject of Milk, and the best mode of its preservation by cold and quiet.

"This is the process practised by dairymen generally, who are compelled to send their milk to market. It consists in cooling the milk to about 40° Fahrenheit as soon as possible after milking, and in keeping it at that temperature, in perfect quiet, till it is ready to be carried to the cars or otherwise conveyed to the place of distribution.

"The essential requisite is a spring of cold water. The quantity of water is not of so much consequence as its degree of coldness and its permanency. The water should be conducted under ground the shortest possible distance to a suitable place for the location of the milk-house. This place, if possible, should be on the north side of a hill, well shaded, and so situated that the water from the tank will readily flow off. The house should be of such size and form as to admit of a tank two feet wide, and of sufficient length to hold all the milk cans. The depth of the tank should be about four inches less than the depth of the can. Each can should have a separate division, and the divisions so arranged that the water may pass from one to another.

"The water from the spring should enter at the bottom of the first division, and pass from the top of the first into the second, then from the bottom of the second enter the third, and so on, alternately entering at or near the top of one and the bottom of the next division.

. "The tank should be so arranged as to be out of the way of currents of air.

"The ventilation of the house should be only sufficient to keep the air pure. Most milk-houses admit altogether too much air. In all cases, ingress of air to the house should be prevented as soon as a thunder shower is seen rising, and no admittance allowed until the milk is to be removed. In clear or rainy weather the ventilator may be open, but never in showery weather.

"Ozone, which is freely generated by electricity, acts energetically on milk, souring it in a few minutes, — many times destroying the milk before the shower has passed over. Therefore, all air from the vicinity of thunder showers, which always contains ozone, should be carefully excluded from the milk-house.

"Having prepared a place for the reception of the milk, its treatment remains to be considered.

"The cows are milked in the cool of the evening, just after sunset, and the milk is strained into the cans which are to convey it to market. As fast as the cans are filled they are placed in the tank. The cans to remain *uncovered* so as to allow the animal heat to pass off; after which the cans should be stopped, and not allowed to be moved, or even jarred. The tank should be so constructed as to be disconnected with the building. It should rest flat on the ground, so that any jar of the building cannot disturb the milk in the tank. In the morning the cows are milked before sunrise and the milk placed in cans as before. When the milk is to be carried to the cars, after being thoroughly cooled the cans are placed in a wagon and a wet cloth or blanket is spread over them, and the whole covered with buffalo robes, or other suitable material. At the railroad station the cans are closely packed in the milk-car, without anything being thrown over them, and on their arrival at the place of destination, if at an early hour in the morning, the cans are then taken in carriages and the milk distributed to consumers. By some of the railroads, however, the milk is not received at the depots until a late hour in the forenoon, and is then taken by the milkmen to their milk cellars and placed in large ice-chests. The milk should not leave the cans until it is sold, and if this precaution were taken it could be disposed of at a lower temperature than when it left the milk-house.

"In this condition it will keep sweet twenty-four, or even thirty-six hours. The milk should be cool in all cases before carting. Milk that is not cooled, changes in a few hours after milking, and

during this change it is not a healthy diet. *Sour milk* and milk that has passed through this process of change is not so injurious. It is milk that is in a state of *change* that is unhealthy, and keeping it in a refrigerator or on ice makes but little difference in the time it will keep, as the process of souring had previously commenced."

Many of our milkmen, largely engaged in the retail trade, have small cans, which hold from a pint to four quarts, which are filled from the larger cans to suit their customers, and left at an early hour in the morning.

Families should have two or three vessels kept exclusively for milk; so that the same vessel should not contain milk two days in succession. Never should the milk be allowed to remain in the cans left by the milkman. It is impossible if the cans be in constant use, to keep them sufficiently cleansed and aired for the milk to remain in them good and fresh.

During this year my attention has many times been called to families in consequence of the bad *taste* and *smell* of the milk caused by the cows feeding on turnips, which gives a disagreeable taste, and moreover produces very thin watery milk.

Again — Oil-cake produces much and rich milk, but seriously injures its quality by giving it a bad flavor.

Cows sometimes eat objectionable weeds, and thus a bad flavor is imparted to the milk, especially during severe drought. When pasturing affords insufficient sustenance, they are apt to resort to leaves and shrubs that ordinarily are left untouched.

In most of our stores and shops where milk is sold, it is retailed to customers from the cans in which it is left by the milkman, and in many of these places sufficient care is not taken to agitate the milk, so that those persons who are first served obtain all the best of the milk, and the last receive poor, skimmed milk, for which they pay the same price. No wonder they often exclaim, "Why, it took more than a pint to color a cup of tea; I know it's more than half water." These complaints can

easily be prevented by stirring the milk and bringing it all to a uniform quality before supplying the customer. By this simple act of justice, dealers will save their reputation and the needless vexation incident to such complaints.

In answer to the many inquiries in regard to the condensed milk prepared by the Lewis Brothers of this city, I would say — that it is especially adapted to children, and no family should be without it. In our large cities where, (especially in the winter season) it is often difficult to obtain pure, fresh milk, the condensed milk will be found of inestimable advantage. In fact, the want of pure milk is undoubtedly a very prolific cause of weakness, debility, sickness, and in too many cases, of *death* among children. Wherever, therefore, in my visits, I have found drooping and sickly infants, I have unhesitatingly recommended the use of this valuable preparation; and in all cases so far as heard from, a striking, rapid, and permanent improvement has been the result.

This, however, is at best, only a temporary and very partial substitute; not in the least affecting the importance of the purity of milk for general supply. Indeed, we cannot but feel that the main object of this report and the chief duty of this office were but ill performed were we to pause here, on the very threshhold of a topic so vital; not only to the general health, but to the sanitary condition and comfort of children — the very central pivot of domestic happiness — the source of the keenest joys and sorrows of so many homes; for it is to this very point that the entire experience of this office yields its most valuable evidence. When we consider that the mortality of children far exceeds that of any other period of life, and that its utter helplessness alone — apart from the still stronger claims of affection — is a sufficient ground of sympathy, is it not clear that a weighty responsibility rests with the community to see to it that no poison, no adulteration, no deception whatever be allowed to mingle infection with those sources of infant life and strength,

which must, in due time, succeed to, and often wholly supply, the mother's tenderest office.

It will be observed that a larger number of cases have been analyzed than there were complaints made in court.

In some of these cases the amount of adulteration would not justify a complaint; in others, the analyses were paid for by parties more directly interested, and not within the limits of your Inspector; and a number were against producers in the country, who extended their milk to be sold in this city, and by the assistance of this office they were brought to justice and more severely punished than they would have been here.

Within a few days of the close of this report, there passed through this office three or four large cans of milk, direct from some of the producers in Worcester County. Samples of this were analyzed and furnished still further proof that the extending and skimming is not always confined to milkmen — some of these specimens were far worse than any milk that has been analyzed during the year. It is usual to cast the odium of adulterating and "extending" milk upon the milkmen, alone; but the frequency of cases like the above proves that other parties in the milk trade are far from being altogether blameless.

In closing this report, your inspector would acknowledge the kind assistance rendered by the prosecuting attorneys and officers of the courts.

He would also return thanks to Dr. James C. White, chemist, for his valuable professional services and the invariable promptness with which they have been rendered.

Respectfully submitted.

HENRY FAXON *Jr*

City Hall, Boston, April 1, 186[illegible]

Gift of the Executors of Henry Horton.

City Document. — *No.* 38.

CITY OF BOSTON.



TENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1869.

In Board of Aldermen, April 5, 1869.

Laid on the table, and ordered to be printed.

Attest:

S. F. McCLEARY, *City Clerk.*

CITY OF BOSTON.

To his Honor the Mayor, and Aldermen of the City of Boston.

GENTLEMEN: The undersigned respectfully submits the following report, from March 31st, 1868, to March 31st, 1869, inclusive.

The milk trade of Boston is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those persons who keep more than one cow, in the city proper, Boston Highlands, South and East Boston.

Retail dealers are those who sell in small quantities from market-places, stores, shops and cellars.

The dealers in the Highland District have been registered, and are included in this report.

Number of cows kept within the limits of the City of Boston	713
Viz: number in the city proper	34
Number at Boston Highlands	435
Number at South Boston	105
Number at East Boston	139
Number of persons who keep but one cow	177
There have been recorded the names and places of business of wholesale dealers in milk since last report	123
Whole number of wholesale dealers registered	981

Whole number of wholesale dealers now in business,	368
Whole number of wholesale dealers now selling from carriages	255
Whole number of small wholesale dealers, who keep more than one cow and sell to the neighborhood	143
Number of retailers in milk recorded since last report	251
Whole number of retail dealers in milk recorded to date	2,655
Number of samples of milk inspected since last report	1,630
Number not adulterated	1,153
Number more or less adulterated	477
Number of cases analyzed by chemist	10
Average amount of adulteration in the cases analyzed	$40\frac{6}{10}$
Largest amount of adulteration, water intentionally added in 100 parts, in the cases analyzed	53.49
Least amount of adulteration, water added, in the cases analyzed	15.14
Number of cases pending in the courts at the date of last report	2
In one of which there was an acquittal by the jury, and in the other, the defendant absconded.	
Number of complaints in Municipal Court	1
Number convicted in the Municipal Court	1
Number of complaints to the Grand Jury	7
Number of bills of indictment by the Grand Jury	2
Number of cases convicted in the Superior Court	2
Number of cases now pending in the Supreme Court	2
Number of gallons for daily supply of milk for the City of Boston	19,686

Daily cost to consumers	$6,299,52
Number of gallons for supply one year . . .	7,185,390
Cost to consumers one year . . .	$2,299,324 80
The expenses of this office have been as follows viz: for the analysis of milk	$130 00
Stationery, record books, etc.	50 13
Inspectors' small bills for assistance, lactometers and other milk instruments	36 40
	$216 53
For violations of the milk law there have been paid in the Municipal and Superior Courts fine and costs amounting to	$48 15

I would remark that my whole time and attention have been devoted to the duties of my office. Private families, stores and shops, have received constant attention, and many will bear their testimony to the aid and assistance that have been rendered by this office in cases of adulterated milk during the past year.

The following information being useful from year to year, is inserted from my last report. "The contracts for the supply of milk are generally made twice a year, viz: on the first of April and the first of October."

"The milk-cans used for the conveyance and sale of milk by the dealers, are of two classes. The large cans which hold nine quarts and a pint, are in general use by the milk trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans which hold eight quarts and one-half pint, are mostly in use on the Fitchburg, Lowell, and Eastern railroads, and no milkman is considered equipped for business unless he is the owner of two or three full sets of cans — either eights or nines, as above described, sufficient to contain the necessary milk for his daily

route, one set being in use, while the others are on their way to the country for a fresh supply. Many of the milkmen, engaged in the family trade, have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers."

The price of milk this summer has been about the same as in the year previous, viz: "At the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-eight cents. This is sold to stores and shops, at from fifty-four to sixty-two cents per can, and is retailed in smaller quantities to families at eight cents per quart."

April, 1868. The first part of this month the weather was fine and pleasant. The supply of milk in the city was about equal to the demand.

This month, some of the milk producers of Worcester County, placed a new milk car on the Boston and Albany Railroad, which has brought in, daily, from one to three hundred cans of milk, which will compare favorably with any received in the city of Boston. We receive by this road, daily, from twelve to fifteen hundred cans, a portion of which is delivered immediately on its arrival.

This month has been mostly devoted to inspecting the milk in the Boston Highlands, and recording the names and places of business of all dealers in milk. Many in this part of the city are supplied from the same carriages that furnish the families and stores in the south part of the city proper.

These men leave their milk on the way in from the towns in Norfolk County. The facilities also for keeping cows are better in this than in any other part of the city and in this way many of the inhabitants supply themselves and their neighbors.

The middle of this month was cold, rainy and stormy; latter part warm and pleasant.

Admitting the standard of pure, extra good milk to be 20°,

and pure good milk 19°, the average standard for this month at the Boston Highlands was 18½°.

MAY was cold, with frequent long rain storms. The supply of milk was abundant, more than equal to the demand. By inspection at the north part of the city, the milk proved to be unusually free from adulteration, and, as was the case last year, large quantities were sold to parties at a reduced price for making butter.

The average standard of the milk for this month at the north part of the city was 18½°.

JUNE opened cool, with frequent rains, and there was a full supply of milk for all demands. The latter part was warm and dry, with an increased demand for milk, which some of the dealers found it difficult to supply.

The average standard of the milk at the north and western part of the city this month was 18½°.

JULY commenced dry and hot. The supply of milk was on the increase, and the dealers were generally enabled to meet the demand. Towards the middle of the month, however, the supply gradually decreased, while the dry hot weather greatly increased the demand, and many of the dealers left their customers only a limited supply, which others were unable to do at any price.

During this month, quite a large number of cans were brought to this office for inspection, by the milk agents, who declared them to be direct from the cars on their arrival. The whole proved, on inspection, to have been either skimmed or largely extended, and in some cases both.

The average standard of the milk in the central and eastern part for this month was $17\frac{89}{100}$.°

The average in the north and eastern part of the city, for July 1860, was $16\frac{98}{100}$.°

AUGUST. The first part of this month was wet, with much thunder and lightning. Large loads of milk were destroyed by

the sudden changes of the weather; but in general the supply was also much larger.

As the middle of the month was cooler, the dealers were again enabled to meet the demand. Towards the last of the month the supply was limited, and some of the milkmen supplied those less favored, at a greatly advanced price.

The average standard of the milk at the south part of the city was 17¾°.

On the 25th of this month, the Inspector visited by invitation some of the dairy farms in Worcester County, from which comes daily a portion of the supply for the city of Boston. Many of these farms are admirably arranged for this particular branch of business, with fine herds of cows, of the Ayrshire, Durham, and some of our best native stock, and buildings arranged for their comfort and convenience, with constant flowing streams of cold water for their use and for cooling the milk for market.

The milk train from Westboro' leaves the depot for Boston at 10 o'clock, P. M., and previously, during the evening, may be seen carriages from different parts of the country coming in loaded with from ten to two hundred cans each. These cans are closely packed with ice in a closed car, and during the night reach Boston.

September brought frequent rains and warm weather. With some of the milk dealers the supply from the country was quite limited. The Inspector was chiefly engaged at the south part of the city and East Boston, with due regard, of course, to a general oversight of the other parts of the city. At the south part, where the milk has generally been found quite free from adulteration, at this time it proved inferior to that of some of the poorer wards in the city.

The average standard of the milk at the south part of the city and East Boston, this month, was only 17¼.

October. On the first of this month, the winter contracts commenced at the following prices, viz, from forty to fifty cents

per can at the farmer's door; at the cars in this city, from fifty to sixty cents; delivered to stores and shops, from sixty-two to seventy cents; and retailed to families at nine cents per quart.

In general, with the large milk dealers, the supply was about equal to the demand. The weather was cool and wet.

The average standard at South Boston, for this month, was $18\frac{1}{4}°$.

November was cold and wet. The price of milk appears to have given general satisfaction alike to farmers, milkmen and consumers.

The latter part of the month, notwithstanding the annual Thanksgiving, — a time when usually extra milk is in great demand, by previous arrangement of those interested in the trade, — an abundant supply was obtained; and never have so few complaints been made at this season of the year in regard to quality.

During this month, eighty samples were inspected in different parts of the city, and the average standard was found to be 18°.

December was pleasant and moderate throughout. The supply of milk with some of the small dealers was quite limited, and with others not so abundant as last month. During the winter season, a portion of the fresh milk is retained either by the producer or the milkman, and the *oldest* milk distributed for consumption: so that, when received by some of our families, it is from three to six days old, and has, in many cases, been repeatedly *frozen* and *thawed* in the cans. In such cases it is of course wholly unfit for use, and is one of the most prolific sources of complaint, and of really serious and even dangerous results. This old milk, even when not adulterated, produces more alarming symptoms in a family than good milk, under some of the usual methods resorted to by those who extend it; as, for instance, with the addition of burnt sugar, which however dishonest and unjustifiable, is not really *dangerous*, when we con

sider that twenty pounds are sufficient to color thirty-six thousand five hundred cans.

The average standard in different parts of the city for this month was $17\frac{3}{4}°$.

January, 1869, was mild and pleasant throughout. In general the supply of milk fully equalled the demand, there being no call for an extra quantity in the winter season. The average standard in different parts of the city for this month was 18°.

February was unusually mild, and the winds mostly southerly; with two or three heavy but short rain storms. The supply of milk was fully equal to the demand. The average standard was about $18\frac{1}{4}°$.

March opened and continued pretty steadily cold; quite in contrast with the mildness of midwinter, and more like the late fall and opening winter months. Standard of milk $18\frac{1}{4}°$.

On the 9th of March, 1868, a petition was presented the Massachusetts Legislature from the milk producers' association of this State and New Hampshire, for further legislation in regard to the sale and inspection of milk, and the following act passed and became a law June 28, 1868:

AN ACT

To amend "An Act in relation to the Sale and Inspection of Milk."

Section 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance, has been added, knowing the same to be adulterated or to contain water or any foreign substance, shall, for the first offence, be punished by a fine of one hundred dollars and, for any subsequent violation, a fine not less than one hundred dollars, nor exceeding three hundred dollars, and imprisoned in the House of Correction not less than thirty nor more than ninety days.

Sect. 2. The penalties provided in the preceding section, and those provided in the act to which this is in addition, may be recovered on complaint before any court of competent jurisdiction; and one-half of the amount of fine imposed, shall go to the complainant or informer, and the remainder to the treasurer of the city or town where the offence was committed.

Sect. 3. It shall be the duty of every inspector of milk to institute complaint on the information of any person who may lay before him satisfactory evidence on which to sustain the same, and he shall be entitled to receive one-half the amount of any penalty recovered therefor, and shall pay over the same to the person who has first given him the information on which the complaint was made.

Sect. 4. The several inspectors of milk in the cities and towns of this commonwealth shall make known the provisions of this act, by advertising the same from time to time, at least once a week.

Approved May 27, 1868.

At a meeting of the Grand Jury for the County of Suffolk, July the sixth, your Inspector placed before them two cases against different parties, for selling adulterated milk. The jury appeared satisfied that the accused sold the milk, and that it was badly adulterated; but they were not convinced that sufficient proof existed, that the accused either adulterated the milk themselves, or knew it was so adulterated at the time of sale.

From this cause or some other objectionable feature in the law, the jury were satisfied that no successful action could be sustained against them in court; consequently a bill of indictment was not found.

When we consider the great distance from which a large portion of our milk comes, and the number of hands it passes through, from the cow to the consumer, — the adulteration,

detection and conviction, are matters involving greater difficulties than most persons imagine.

First, as to adulteration; the only legal proof is *chemical analysis*, and a sworn certificate from the analyzer, which cannot be obtained, generally, in less than twenty-four hours; and several cases have, for one reason or another, terminated unfavorably to the government.

Detection. That class of milkmen who habitually extend their milk, carry two, and some of them three qualities. To their best paying family custom, they generally furnish good milk, when they are compelled to do so, or lose their customer.

The stores, shops, and poorer families, receive their second grade milk, extended to the amount of one quart or more of water to the can, which is made to pass with them as good, fair milk. The third grade milk is palmed off by many dishonest dealers in times when the supply is not equal to the demand, chiefly in extreme hot weather, in seasons of drought, and especially at the approach of Thanksgiving.

This milk is found extended by the addition of from twenty-five to thirty-three per cent of water, and in times of extreme scarcity mere slops have been left at some of the poorer shops, which analysis has proved to be adulterated to the amount of more than fifty per cent; and even this fails to bring forth complaint from either shopkeeper or consumer, as this quantity of water forces to the surface what little cream it contains, to aid in the deception.

Some of these places often change their milkman, who receives his pay for the milk the same day on which it is left; whilst others have a credit for a week or more. The milk stores in these places, seldom contain any name or place indicating the person who furnishes the milk; and generally those connected with the shop are, on this subject, wholly ignorant.

The store milk is usually left on the door steps between the hours of four and six o'clock in the morning, rendering the

identity of the person that leaves it, for various reasons, quite difficult.

This ability to identify is as important in milk cases as in any others. If the inspector be recognized by the criminal, when he is leaving an impure article, good milk will be substituted for the bad, and the latter left with customers in another part of the city. It is common to find these places supplied by two or three different milkmen, who change their extended milk from day to day to other customers; so that milk which contains thirty-five per cent added water to-day, may be followed by quite good milk to morrow.

In the month of July, on the information of a police officer, your inspector went with him to a poor family, on Fort Hill, to examine some milk. On inspection, it was found to contain more than twenty-five per cent added water; and the fact that a poor, sickly babe was dependent on this milk, was not the least interesting feature in the case.

On inquiry, he found the milkman to be one whom he had long been in pursuit of, and who left the milk daily, at an hour when there could be no mistaking the person. Secrecy was enjoined on the family in regard to the inspector's visit, which was faithfully promised. Feeling confident that his efforts would soon be crowned with success, he visited the family the next day, and found to his surprise, the milk greatly improved. The family assured him that nothing had been said or done to excite suspicion in the mind of the milkman, and he continued his efforts for nearly a week, the milk varying in quality from one day to another; but never sufficiently adulterated to warrant a chemical analysis; and it finally appeared that, although no direct information had been given to the milkman, the mother had sent to a distant part of the city on the day of the first visit, to advise her sister to *notify* the milkman, who supplied both families.

This is only one of the many similar artifices resorted to not

only by private families, but by those in charge of places from which milk is sold, some of whom spare neither time nor trouble to screen their milkman from merited punishment. When summoned to appear in court, they are often unwilling witnesses, and but little dependence can be placed on their statements.

If the defendant is convicted, their confidence in him seems to remain the same, as they continue to receive his milk, which he will extend enough in a short time to pay the cost of prosecution.

Conviction. On the seventh day of August, your inspector placed before the Grand Jury for the County of Suffolk, three more complaints for selling adulterated milk. The first against one of the Boston milkmen, for selling his extended milk to a private family at the south part of the city. It was proved that the milk was adulterated when sold, but for the supposed want of *guilty knowledge*, or other necessary proof, they were confident that an action in court could not be sustained, and a bill of indictment was not granted.

The other two complaints were for selling adulterated milk to two stores in different parts of the city. The accused had been before our courts on similar charges a number of times and twice or more convicted. In these cases, evidence was placed before the Jury of a nature which removed all doubts as to the adulteration, the sale of the milk, and the *guilty knowledge* of the accused, and a bill of indictment was readily certified to the Superior Court. This was not the man to enter this court, or any other, and plead guilty, under any circumstances; he did come in, however, and gave bonds to appear for trial. He will appear with able counsel, as he has done before, and contest the case up to the point of final judgment.

Men belonging in the city, or in the country, accused of the crime of adulteration of milk, have generally passed in the community in which they live as respectable men, and are of a different class from those usually found on trial before our criminal

courts. The latter have, with few exceptions, neither money nor friends, while the former have both. Hence they employ able counsel to defend themselves, especially since the fine was increased to one hundred dollars and costs, in addition to the peril of their reputation.

Under these circumstances, however deeply implicated, they intend, at all hazards, to be considered innocent until proved guilty.

From April 1867, to April 1868, more than twenty milk cases were carried before our courts, under the laws of 1864, and with one exception, the parties plead guilty, paid their fine and costs, and were advertised, as required by the statute in such case made and provided.

In these cases the fine and cost amounted, generally, to twenty-five or thirty dollars; a sum insufficient to obtain the services of good counsel. Again, the indictments did not charge them with adulterating their milk themselves, but only of selling milk that was adulterated.

The "*guilty knowledge*" was not averred in the indictment, and they considered it safer to settle their cases than incur the expense and risk of a trial.

There are some of our laws, which, when brought to a severe trial before our courts, do not always stand the test, and this may have been the case with the milk law, excepting, perhaps, for a period of about four years, when it seems to have been in its most perfect form to secure the highest ends of justice, viz, the best protection of the public.

It has often been said by the innocent sufferers from vice and crime, that our laws are made and executed for the government of good honest citizens, and not for the thousands of rogues who infest our country. It is not my duty, however, to criticise the law, but to execute its provisions, whatever they may be, to the best of my ability.

Nearly every season for the past nine years, your Inspector

has been requested to appear before a committee of the Legislature in regard to the milk law.

During the winter of 1864, a bill was placed before the Legislature in regard to the sale and inspection of milk, which was referred to the Committee on Agriculture, by whom it was approved, and readily passed both branches, and became a law, April 1st, 1864.

One of the most important features of this law reads as follows: "Whoever sells, or keeps, or offers for sale adulterated milk, or milk to which water or any foreign substance has been added, shall, for the first offence, be punished by a fine of twenty dollars, and for a second offence by a fine of fifty dollars, and for any subsequent violation, he shall be imprisoned in the House of Correction not less than thirty, nor more than ninety days."

It may be observed that, in this section of the law the word "*knowingly*" was not inserted, and its omission well served the intended purposes of justice; for during the four years this law was in force, seventy-five cases passed through the courts, fourteen of which were sharply contested, nine were convicted and five discharged, and of the remaining fifty-seven, the accused plead guilty and paid their fines and costs.

A number of the nine convicted cases were carried from the Superior to the Supreme Court, where they remained unsettled for a long time, and were finally returned to the Superior Court for sentence.

The Superior Court, under this law, have generally ruled, evidently for obvious reason, that *all* persons must be held responsible for the quality of the milk which they sell, the government not being obliged to prove their guilty knowledge.

The great point which underlies this ruling, so essential to the protection of the public, is, that a *criminal ignorance*, which is the result of indifference to or neglect of known duty, is as culpable as "*guilty knowledge*," since an acquittal on the ground

of "guilty knowledge," is only a premium on carelessness and deception; to avoid responsibility for what they sell, men have only to buy with their eyes shut. This doctrine is not allowed in any other branch of business. Where then, would be our remedy for the sale of impure milk?

The law of 1864, above referred to, was framed by a man of experience in the criminal courts of this State, who had often acted as counsel both for and against the government, in the trial of milk cases under former laws. He well knew what was required, and had seen the folly of obtaining a vast amount of unnecessary proof irrelevant to the point at issue, and was intent only on the main feature in this section of the law, viz: "The adulteration of milk, its detection and punishment."

This or any other similar milk law that may be enacted under the present system of the milk trade of Boston, if enforced as it should be, must necessarily prove an invaluable safeguard to the public, who if not thus protected, would be exposed to increasing imposition in regard to an article of food in more general use, and therefore more vitally affecting the general health of old and young than any other. This is particularly the case when the milk is extended, or otherwise adulterated, or what is worse, when very *stale*, and especially so after repeated *freezings* and *thawings*, in which last cases it has become so changed as to cause immediate and serious sickness.

In regard to penalties, if they are severe, it is a well-known fact, that they do not generally meet the approval of the community, nor of juries, so as to secure conviction.

On this point, may there not be in the community a morbid sympathy for respectable criminals, which leaves an innocent public unprotected?

The courts of this county and their officers have always taken a deep interest in all the milk cases brought before them, and have used all honorable means to obtain conviction of the guilty party.

Where it has been known that the accused was desirous of pleading guilty, their cases have been brought before the Municipal Court, as the shortest way to dispose of them and save time and trouble for the Superior Criminal Court.

On January the 1st, 1869, there remained in this court three hundred and seventy cases unsettled, showing the vast amount of labor to be performed, and continually increasing; so that many cases must necessarily remain unsettled for a long time. There are now in this court four or five cases for selling adulterated milk, which have been pending from six months to two years. The last trial by jury was on December the twenty-first, 1866; from that time till the law was changed, twenty-eight or thirty persons plead guilty, and paid their fines and costs, which this class of offenders will not be likely to do again, under the present law; and judging from the past, our record of *convictions* must be small indeed, and the course of justice greatly hindered, and its security seriously imperilled. Again, from three to six witnesses are required in the trial, and when, after a long interval, the cases do come up, these witnesses can with difficulty be found, and if they could, many of the circumstances connected with their testimony are from the very lapse of time, forgotten.

Your Inspector is well satisfied that every complaint made to the courts by him has been duly considered and brought to trial as soon as time, circumstances, and the exigencies of the court would admit.

We all know that a portion of our milk is every day more or less adulterated, or skimmed, and sometimes both: it is so found in stores, shops, and private families. In the stores, in undisturbed cans, the milk is found to be of the same quality as that on the counter for sale; and with few exceptions, it is the dealers' practice, of both large and small places, to sell their milk, as they receive it from their milkman, and there are many places in all parts of the city where good milk can be obtained.

They in the first place endeavor to secure an honest milkman,

and secondly, are willing to pay the highest price for their milk. These places do not expect to make much if any profit on this article of trade; but feel obliged to keep it to accommodate their customers, and to assist in increasing the business of their place.

Many of our families send to these places for their extra milk, and frequently obtain a better article than they receive from their own milkman.

There are other places, however, where, while intending to keep good milk, the dealers tell the milkman, that unless he reduces his price, they will be obliged to obtain their supply from other parties.

The milkmen are continually *hard pressed* on this point. However disposed they may be to be honest, they have the alternative of losing a customer or of bringing the water to their aid to counterbalance the reduction in price, which they generally do sufficiently to maintain the profit on their milk, which is found on inspection to contain about one-eighth or more of added water.

The third and lowest class places sell from one to three cans of milk daily, and some of them have no regular milkman; but they buy, and pay for their milk, from the first one seen on the street in the morning. The most of this milk has been either skimmed or watered, and the former plan is more generally adopted during the summer months. Others have their regular milkman, who leaves their milk very early in the morning, on the shop door-step, and, after other customers are supplied, returns for his pay and the empty cans of the day previous. This milk also is more or less adulterated, and the occupants of the store obtain it for three or four cents per can cheaper than the market price of good milk.

Against these places, complaints have been made in court, the milkman paying the expense of prosecution.

Private families sometimes for various reasons, extend their milk. Cases have occurred where they have used water, molas-

ses, and table salt, and immediately sent for the services of the Inspector. In such cases, it appeared that there was a large unsettled milk bill pending, and that their milkman was supplying them with good milk.

The adulteration, however, but too often comes from those who *supply* families; and where the fact of adulteration is clear, there are two remedies in addition to prosecution; first, the milkman can be discharged; and secondly — be it remembered — his bill is not recoverable in law. These are remedies which may be made to reach back from one criminal through another to the very barn door of the producer.

The Inspector's attention has been called to some of the boarding-houses, and fault has been found with some of the hotels, by the boarders, respecting the quality of the milk. It is clear that milk is adulterated, in some of these establishments, after passing from the hands of the milkman. In some cases where trouble seemed seriously to threaten the innocent milkman, confession has been made by the guilty keeper of the establishment, who plead in excuse that provisions were high, and milk so scarce, that extension was necessary to make it *hold out.* This making the milk "*hold out*" will be found equally chargeable upon not a few of our *eating-houses* and like establishments. This class should remember that this "*making the milk hold out*" is the *very crime* of the offending milkman, and for the punishment of which, the law, with its prohibition and penalties, has been enacted, and that the practice, in all cases, is *equally criminal*, and equally within the intent and scope of the law, because it is a dishonest imposition on the confidence of their customers, and a clear and flagrant violation of their rights. Some milkmen not only adulterate their milk, but remove the cream, which is equally dishonest and criminal. Many of them have the name, and deservedly, too, of being the most largely engaged in the skimming process and the adulteration of the milk sold in the city of Boston. Dishonest men are

found everywhere. Human nature shows itself in the country the same as in the city; for we all know that milk is sometimes watered, and more frequently skimmed before leaving the dairies. Every year, we have abundant proof of this fact; and many a man has made humble confession, and settled with his victim on the most favorable terms, rather than incur prosecution and a ruined reputation. Notwithstanding all this, whatever may be written or said in regard to the general quality, or the price, of the milk in the city of Boston, special care has been taken during the past year to obtain facts on this point; and we can assure our citizens that Boston, on this, as on many other matters, will compare favorably with other large cities in this country.

What constitutes a good milk route in the city of Boston? We reply, milk from the best dairies, the number of cans daily delivered, the class of customers supplied, the number of cans delivered at any one place, and the purity of the milk when delivered.

We have now in this city two hundred and twenty-five milk routes, divided into three classes. The first are considered by their owners to be worth from six to ten thousand dollars, with horses, carriages, three hundred milk cans, an interest in milk pits, ice houses, etc. These routes distribute from seventy to one hundred cans of milk, daily, to our first-class public houses, dining saloons, large groceries, and some of them, to a few private families. These places seldom require the services of your inspector. They are able and willing to pay the highest market price for good milk, which they generally receive. Routes of this class do not often change hands; and many of them have been conducted by the same men for the past ten or twelve years.

The second class. — These routes are sold at from three to six thousand dollars, varying also in price according to the number of cans distributed and the class of customers supplied.

Some of these routes furnish milk to private families exclusively; others only to stores. These extend their milk as circumstances may seem to require. To this class belong many of the milkmen from the neighboring towns, who bring in, daily, from twenty-five to forty-five cans each. Many of these men bring in good milk and supply some of the most particular families in the city; while others always extend their milk more or less, in times of scarcity, from twenty-five to thirty-three per cent added water. Some of these routes often change hands, while others remain in the same family, for many years, and are handed down from father to son.

The third class routes are sold frequently, varying in price from one to three thousand dollars, and using from twenty-five to forty cans of milk daily, which is distributed to small shops, and poor families, many of whom care but little as to the quality of the milk, provided they obtain a low-priced article, which they certainly do, and dear at that. It is true that even *some* of these men have good milk; but generally they undersell other milkmen, and entice away their customers; and we find the standard of their milk to be a fair index to the general character and reputation of the men.

During this year, twelve or more new routes have been commenced by parties able to obtain a small supply of milk, who, in order to secure customers, sell their milk at a reduced price; and to sustain themselves, resort not only to the skimming process but also to extending their milk without limitation. These men commence business with little capital, and soon find themselves unable to pay the agent for the milk already received. Hence they sell to other milkmen the few customers they have obtained, and are seen no more. There are others, however, that have money and friends, and go into the business with a few cans of good milk, with a determination to succeed. They are always upon the watch for a customer that wants good milk, and is willing to pay for it. These men would pros-

per in any business; and in two or three years they build up a first-class milk route.

There are thousands of families within the limits of the city of Boston who are good judges of the quality of their milk, and who know at once when they need the services of the Inspector. While others are so *indifferent* as but seldom, if ever, to have the quality of their milk as it should be. It is either half skimmed and not watered, or else watered and not skimmed. Their milk is in accordance with their other articles of family consumption, and if they can but obtain their supply for a cent or two less, per quart, and receive from their milkman an extra pint occasionally, they are perfectly satisfied.

Friday, December 8th, 1868, a small sample of milk was brought to this office for inspection by a physican of South Boston, who stated that he came from a family in his neighborhood where his professional services had been required in consequence of bad milk. The sample brought to the office being small, no satisfactory result could be obtained. Your Inspector immediately visited the family, and found the mother and three children who had partaken of this milk, convalescent. In another family at the same house, and supplied from the same source, the children not relishing the taste, refused to partake of it; but their father, a stout, able-bodied man, having used a pint or more with his breakfast, was taken sick at his work and obliged to return home.

This family had used but a small portion of the milk taken from the milkman in the morning; the remainder, on being examined, revealed at once the cause of the sickness. This milk contained a fair amount of cream, with the usual specific gravity of pure, good milk. But it had a perfect taste of bitter buttermilk, although it gave no indications of any of the usual forms of adulteration.

The milk *was old*, and had been undoubtedly frozen and thawed in one of the large cans used in the sale and conveyance of milk.

From information obtained, independent of the milkman, it was shown that two extra cans of milk had that morning been bought from one of the railroad milkmen.

This milk, on being thawed, was considered unfit for use; and the cans were marked and placed apart from the other milk. One of these cans, however, was taken from the milk carriage by a boy in the employ of this milkman during his absence; and the milk left to the families as above related, was from this can.

Persons are sometimes made sick by the use of meats, fish, water, and oftentimes by milk, from causes which careful chemical analysis utterly fails to detect. But in the present case, cause and effect are plainly visible without an analysis.

Persons should always refrain from using milk when the *taste* and *smell* are unpleasant; for although the cause may seem to be *comparatively* harmless, as when it results from want of care in feeding, thorough cleaning of the udder, cleansing the cans, and properly cooling the milk for market, still these are all serious and disgusting defects, arising from ignorance, carelessness, and often indifference on the part of those concerned, which is inexcusable and in fact often criminal when we look at it with regard to what is due from man to man, and still more when we consider its pernicious effects on the public health, comfort and happiness. In fact, when extraneous matter, as for instance, *dirt from the udder*, is allowed to get into the milk so as to affect its taste, as a very small quantity will affect it, it amounts, in fact, to something viler than adulteration, and must be so regarded.

A word as to one crime still more serious. It is when a dairyman deliberately, or from want of due care, allows milk that is bloody, or the first few milkings after "coming in" or from a cow known to be diseased, to go to market thinking or hoping it may escape detection when mixed with that which is pure. This only vitiates the whole; and the only way to prevent this kind of unscrupulous criminality, and the serious evils in its train, is to maintain a high standard, and hold men just as re-

sponsible for a *criminal ignorance* as for what is termed in court "*guilty knowledge*" of adulteration or impurity.

The only safeguard is, to require all dealers to exercise due care and watchfulness over those from whom they purchase, and to hold all concerned responsible for what they sell.

The following remarks are made in consequence of the large number of cows kept within the limits of the city, and fed largely on brewers' grains, and the number of families, in part or wholly supplied from these cows, whose milk analysis and other tests have proved inferior to either the desiccated milk, or the pure fresh milk from the country.

The condensed or desiccated milk, which is the milk as it comes from the cow, after the water is evaporated, with the addition of some simple chemical preparation to prevent souring in the manipulation, and a definite quantity of pure loaf sugar, is the best substitute for fresh new milk that a family can have who do not keep and milk their own cow, and *cannot obtain* good fresh milk.

In all our large cities it is safer and better to feed infants on desiccated milk, diluted to its original consistency, than to feed them on the impure or extended article sometimes sold as milk, and even if one could always depend upon his milkman, and feel assured that he sold nothing but what was milked from his cows, how inferior the milk from cows kept in cities, and fed on brewery grains and slops, to that of country cows whose feed is the fresh and fragrant herbage of upland pastures.

This milk, like sugar, dissolves better in *warm* than in *cold* water.

One pound will make three quarts of good milk. For tea, coffee or chocolate, it can be put on the table and used as sugar, but should be allowed to dissolve in the cup a moment before being stirred, as the cream globules will then remain unbroken.

For young children, a table spoonful dissolved in a teacupful

of water, is sufficient. For older children and invalids, the proportion must be regulated by circumstances, and the taste and judgment.

Let it be observed, that we only recommend this compound as a substitute where the pure, fresh article cannot be obtained, and as preferable to city or even country milk, from cows fed on brewers' grains, and swill.

Desiccated milk is a distinct article of commerce, acknowledged to be, as it necessarily is, a compound equally liable to adulteration and impurity, without due care in regard to all the articles which enter into its composition, and especially in regard to the original milk itself. *Soda* in *excess*, is, no less than *saleratus*, deleterious to health, and the time may come, when desiccated milk must be subjected to rigid analysis to insure its purity. "Eternal vigilance," and a high standard of honest dealing, are our only safeguards.

It may not be generally known, that whenever and wherever purchasers have doubts in regard to the quality of their milk, they have only to notify the Inspector at the City Hall, to receive his prompt attention, free of all expense.

In conclusion, the usual acknowledgments are especially due to Dr. James C. White, chemist, for his ready and valuable services; also to the courts, officers, and private individuals, who have interested themselves in the furtherance of the objects of this department.

Since writing the above, some of the milk cases mentioned in this report as pending before our courts, have within a few days been settled.

Respectfully submitted,

HENRY FAXON, *Inspector.*

CITY HALL, BOSTON, April 1st, 1869.

City Document. — *No.* 37.

CITY OF BOSTON.

ELEVENTH

ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1870.

In Board of Aldermen, April 4, 1870.

Laid on the table and ordered to be printed.

Attest: S. F. McCLEARY,
City Clerk.

CITY OF BOSTON.

To his Honor the Mayor, and Aldermen of the City of Boston: —

Gentlemen, — The undersigned respectfully submits the following report from March 31, 1869, to March 31, 1870, inclusive: —

The milk trade of Boston is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those persons who keep more than one cow, in the city proper, Boston Highlands, South and East Boston.

Retail dealers are those who sell in small quantities from market places, stores, shops, and cellars.

The dealers in the Sixteenth Ward (Dorchester) have not been registered, and are not included in this report.

Number of cows kept within the limits of the city of Boston	750
Viz: Number in the city proper	34
Number at the Boston Highlands	440
Number at South Boston	115
Number at East Boston	161
Number of persons who keep but one cow	180
There have been recorded the names and place of business of wholesale dealers in milk, since last report	42
Whole number of wholesale dealers registered	1,023

Whole number of wholesale dealers now in business	376
Whole number of wholesale dealers now selling from carriages	230
Whole number of small wholesale dealers, who keep more than one cow and sell to the neighborhood	146
Number of retailers in milk recorded since last report	151
Whole number of retail dealers in milk recorded to date	2,806
Number of samples of milk inspected since last report	1,680
Number not adulterated	1,160
Number more or less adulterated	520
Number of cases analyzed by chemist	19
Average amount of adulteration in the cases analyzed	28.83
Largest amount of adulteration, water intentionally added in 100 parts, in the cases analyzed,	41.87
Least amount of adulteration, water added, in the cases analyzed	19.25
Whole number of samples of milk analyzed by chemist to date	233
Number of cases pending in the courts at the date of last report, which still remain unsettled	2
Number of complaints in Municipal Court	4
Number convicted in the Municipal Court	4
Number of complaints to the Grand Jury	6
Number of bills of indictment by the Grand Jury	6

Number of cases convicted in the Superior Court	6
Number of cases now pending in the Courts	4
Whole number of complaints in Court to date	190
Whole number convicted to date	119
Whole number not convicted	71
Number of gallons for daily supply of milk for the city of Boston	20,948
Daily cost to consumers	$7,122 32
Number of gallons for supply one year	7,646,020
Cost to consumers one year	$2,599,646 80

The expenses of this office have been as follows, viz:—

For the analyses of milk	$110 00
Stationery, record books, printing, etc.	37 94
Inspector's small bills for assistance	
Lactometers and other milk instruments	43 07
	$191 01

For violations of the milk law, there have been paid in the Municipal and Superior Courts, fines and costs amounting to $206 95

One of the primary duties of this office is to visit all places where complaints have been made, or information given in regard to the quality of the milk, to hear the complaints, to investigate, thoroughly, all matters having a bearing on the subject thereof, and to take such action as shall correct the evil in that particular case, and at the same time produce a wholesome influence, and insure general honesty of dealing in the milk trade, and a high standard in the quality of the milk sold throughout the city. In carrying out this object, stores and shops in all parts of this city where milk is kept for sale, have been visited, and the milk examined; records of which are kept in the office

of the inspector. In many places, the milk is found to be good and pure; in others, quite the reverse; sometimes grossly adulterated, and very inferior in quality. In all such cases, visits are continued until the required improvement is established in the quality of the milk.

It is gratifying to recur to the reiterated testimony of private families, keepers of stores, and parties from the neighboring cities and towns, and even from outside the limits of our own State, to the aid and assistance rendered by this office in cases of adulterated milk during the past year. Many of the complaints above referred to came from persons who assisted in supplying milk to the Boston consumers, and it was considered much easier to check the evil of adulteration in the country than in the city, after the milk had been distributed. In this connection I would observe that a larger number of cases have been analyzed than there have been complaints in court.

In some of these cases the amount of adulteration would not justify a complaint; in others, the analyses were paid for by parties more directly interested, and not within the limits of your inspector.

The following preliminary information will be found useful in this connection before proceeding further: —

The contracts for the supply of milk are generally made twice a year, viz: on the first of April and the first of October.

The milk cans used for the conveyance and sale of milk by the dealers, are of two classes. The large cans, which hold nine quarts and a pint, are in general use by the milk trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans, which hold eight quarts and one half pint, are mostly in use on the Fitchburg, Lowell, and Eastern railroads, and no milkman is con-

sidered equipped for business unless he is the owner of two or three full sets of cans, either eights or nines, as above described, sufficient to contain the necessary milk for his daily route, one set being in use, while the others are on their way to the country for a fresh supply.

Many of the milkmen engaged in the family trade have small cans, which hold from a pint to four or even six quarts, which they fill from the larger cans to suit their customers.

The price of milk, this summer, has been about the same as in the year previous, viz: at the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-eight cents. This is sold to stores and shops at from fifty-four to sixty-two cents per can, and retailed in smaller quantities to families at eight cents per quart.

In consequence of increasing professional duties, Dr. James C. White, chemist, felt obliged to discontinue the analyses of milk for this office after having served the city more than six years, and analyzed nearly one hundred and sixty samples of milk; and your inspector acknowledges with pleasure his valuable professional services, and the invariable promptness with which they have been rendered.

APRIL, 1869. The weather this month was cool and pleasant, with but little rain. The supply of milk was fully equal to the demand.

This month has been mostly devoted to inspecting the milk in the Boston Highlands.

The facilities for keeping cows are better there than in any other part of the city, and in this way many of the inhabitants supply themselves and their neighbors; many, however, obtain their milk from the same carriages that furnish families and stores in the south part of the city proper.

There has been but little complaint, in this part of the city, in regard to the quality of the milk during the past year.

MAY was cool and dry, with the exception of a few days in the latter part of the month, when frequent rains and warmer weather caused the season to advance much more rapidly than in the corresponding month of last year. The usual channels for an ample supply of milk appeared open, so that dealers, with few exceptions, had enough and to spare, and not a little was sold to parties in this city at a reduced price for making butter.

By inspection in stores and shops at the north part of the city, the milk proved unusually free from adulteration.

Upon urgent request, James F. Babcock, an experienced chemist of this city, consented to receive samples of milk from this office for analysis, and attend to the duties previously performed by Dr. White.

JUNE opened cool and pleasant, with an ample supply of milk to meet all demands. The middle of the month was unusually cold for the season. The milk dealers were required to make extra exertions to supply the increased demand, in consequence of the many thousands of visitors assembled to attend the Peace Jubilee. The latter part of the month was wet, and the weather continued cool.

It has often been said by those interested, that the month of June is the most favorable for the manufacture of butter. This fact was apparent in my examinations of the milk in the stores and shops at the north and western part of the city, where, in nearly every place, it was found very deficient in cream, and consequently poor and thin, though not much extended by the addition of water.

July commenced wet, the weather cool and comfortable. The supply of milk from the country was sufficient for all demands. Towards the middle and latter part of the month, however, the supply gradually decreased, while the warm, dry weather greatly increased the demand. The milk agents were compelled to extend their routes to a greater distance in the country, and procure a portion of their supply in places hitherto unvisited.

Many times during this month the milk depots were visited for the inspection of the milk on its arrival from the country, and before its removal from the cars by the milkmen. It was found that, in a number of cans from different dairies, the milk was largely extended by water. Samples of this were analyzed by the chemist, and his certificate confirming the adulteration given to the milk agent, who, thus equipped, in many cases compelled the guilty parties to make a corresponding deduction in the amount of his bill.

August. The first part of this month was cool, with an occasional rain storm.

The customary absence from the city of many families lessened the demand for milk, so that the supply and demand continued favorable through the middle and towards the latter part of the month, when a few days wrought a great change in our milk trade, the supply from the country becoming less every day in consequence of the drought, the pastures affording but little nourishment to cattle.

This scarcity of milk greatly affected our trade, as a large portion of our supply is from that section of the country which suffered the most by the hot, dry weather. Those dealers, however, who obtained their supply within a few miles of this city were not pressed for milk as were those dependent on more distant parts of the country; hence they had a surplus to dispose of to their brother milkmen, at a handsome profit.

SEPTEMBER. The first few days of this month were changable until the eighth, a day which will not soon be forgotten. At about four o'clock, P. M., commenced a violent storm of rain and wind from the southeast, which soon changed to the south and southwest, and continued very violent until seven o'clock, demolishing many large buildings, uprooting large trees, destroying chimneys, etc.

The middle and latter part of the month were fine, with pleasant, cool weather, with few exceptions.

The supply of milk during the month was very limited. Many of the milkmen could leave only a small quantity for their customers, every other day. Some were obliged to abandon them altogether.

During this period, the only available remedy for the deficiency was found in the use of the condensed milk, with the right proportion of water restored; and for a time, there was increased demand for the condensed milk, which, for the time being, seemed to serve the purpose.

OCTOBER. On the first of this month, the winter contracts commenced at the following prices, being about the same as last year, viz: from forty to fifty cents per can at the farmer's door; at the cars in this city, from fifty to sixty cents; delivered to stores and shops, from sixty-two to seventy cents; and retailed to families at nine cents per quart.

By the middle of the month, the supply was equal to the demand, the advance in the price assisted in increasing the quantity. The weather was cool and pleasant throughout the month, with the exception of Monday the fourth, and Saturday the sixteenth.

The general inspection of milk this month was in the stores and shops at the south part of the city proper, and at South Boston. In the latter, the milk has always been found less

adulterated, and of a quality superior to that in any of the other wards.

November, with the exception of a few days in the middle and about the close of the month, was moderate and pleasant; the pastures and fields afforded food and nourishment for cows nearly equal to the amount in the summer months.

The annual Thanksgiving served to increase the demand. The dealers, however, had taken the precaution to secure an abundant supply.

The general inspection of milk in stores and shops, this month, was at South and East Boston.

December. The first part of this month, excepting Monday the sixth, was cool and pleasant; the middle was mild, with an occasional cool day; the latter part was unusually warm, fine weather.

The supply of milk fully equalled the demand, and but few complaints were made in regard to the quality. The time had not quite arrived for the milk to be retained until it became old, either by the producer or the milkmen, as is often the case during the winter months.

In January, February, and March, there is little demand for an extra quantity of milk, and the remarkably open and warm winter has been favorable to a larger supply than usual.

There have been but few complaints of adulteration during the winter; but many, that it was old and often skimmed when received. This is accounted for by many of our citizens purchasing cream, which evidently must have been taken from milk sold to others, who would feel better satisfied to do their own skimming. The sale of cream is all very well; but the skimmed milk should be sold as skimmed milk at a proportionably reduced price.

Any other course is dishonest and criminal.

Consumers often complain of the high price of milk, without considering the great advance in the value of cows, the cost of food and labor, the collecting of milk at various points, and its transportation long distances. The producers, on the other hand, feel that they are poorly paid, — the middlemen, who collect, transport, and deliver to consumers, usually making the largest profit.

The same difficulty applies with equal force to all articles obtained from a distance.

It is believed by many honest and intelligent persons in this community that milk is manufactured to a considerable extent, and supplied to our citizens for family use. It is difficult to understand what is really meant by the term, manufactured milk. If they mean that a portion of our milk is extended by the addition of water, and sometimes a little burnt sugar or China Soy to restore the color, and a little common salt to bring up the specific gravity to the normal standard, all which can be easily detected, they are right. As to any other manufactured or adulterated milk, sold or used in this community, we have the testimony of our ablest chemists, who have analyzed between two and three hundred samples of milk for the City of Boston, and their testimony is unanimous and conclusive to the fact that no other foreign deleterious substances are, or can be successfully, or even profitably, used for this purpose.

Our State has enacted laws covering the whole ground; laws amply competent to ensure to every family absolute purity, and a high standard quality of milk. In accordance with these laws, and to carry out their benign and healthful provisions, the city has placed within reach of every householder, free of expense, the amplest means of testing, daily, the quality

of the milk delivered, and of exposing and punishing the offender. Still, many families are so indifferent to this, one of the primary conditions of health and life, that the shrewd and artful dealer soon learns where good milk is required, and where the adulterated and spurious article will pass without complaint. Some are negligent as to the quality of their milk; some, knowing its quality to be poor, dislike to complain; while others, after calling the inspector, and finding it impure, are unwilling to testify in court.

Now all these difficulties can be prevented by the purchasers taking care to look after the quality of their milk, and discharging the milkman, whose milk is poor, for one more honest.

If this were done, it would operate as a check on the dealer so effectively as to prevent the evil and secure the desired object. But the fact is, milk-and-water people *will have* milk and water for pure milk.

The following valuable information in regard to milk and its adulteration has been received from James F. Babcock, Esq., Professor of Chemistry in the Massachusetts College of Pharmacy: He says: —

"In accordance with your request, I send you a tabular statement of the results of the analyses of milk which I have made from samples furnished by you, commencing April 22d, 1869.

Analysis Mark and No.	Specific Gravity.	Cream.	Solids.	Water.	Percentage of water intentionally added in sample.
No. 217	1.019	8 pr. ct.	8.50	91.50	34.06
" 218	1.025	9.	8.90	91.50	31.53
" 219	1.025	10.	13.65	86.35	None.
" 220	1.022	8.	10.50	89.50	20.00
" 221	1.024	5.	9.90	90.10	26.00
" 222	1.026	6.	10.25	89.75	24.10
" 223	1.025	6.5	9.90	90.10	26.50
" 224	1.026	4.5	8.30	91.70	32.50
" 225	1.025	8.	10.90	89.10	19.25
" 226	1.022	6.	8.70	91.30	35.50
" 227	1.024	5.	9.80	90.20	27.35
" 228	1.023	6.5	10.50	89.50	22.97

The percentage of sugar, salt, caseine, butter, etc., were ascertained, and the results noted on the certificates given you, but have not been included in the statement above. The method of analysis which I have pursued is as follows: —

1. REACTION OF THE MILK. Good milk is slightly alkaline; sometimes carbonate of soda is added to milk to prevent it from becoming sour; in such cases, the milk has strong alkaline reaction, and effervesces slightly on the addition of acids.

2. CREAM. A quantity of milk is poured into a tube graduated to one hundred parts. On standing for twenty-four hours, the cream rises to the surface, and its amount ascertained from the number of divisions which it occupies. The amount of cream, of course, varies considerably in different samples, depending, as is well known, upon the care of the animal, the feed, the season, and many other circumstances. In hot countries, and dry seasons, the quantity of milk yielded is less, though its quality is said to be better. It is also stated that

cold favors the production of sugar and cheese, while hot weather augments the amount of butter. The average amount of cream is nine and one-half per cent, by volume.

3. SPECIFIC GRAVITY. The specific gravity of pure milk averages 1.030, although the percentage of cream, being itself variable, and lighter than water, necessarily affects the specific gravity to some extent, producing variations between 1.026 and 1.035.

4. AMOUNT OF SOLID CONSTITUENTS AND INORGANIC SALTS. A quantity of milk is dried at 212° Fahrenheit. The weight of the residue shows the amount of all the solid constituents. The residue, when ignited, loses its organic constituents, butter, caseine, milk, sugar, etc., leaving the inorganic or mineral salts behind. Carbonate of soda, used to keep the milk from souring, is found in this residue.

5. BUTTER. A certain quantity of milk is soaked up in sand and dried at 212° Fahrenheit. The residue is treated with ether. The ether, on its evaporation, leaves the butter. The total amount of solid constituents, less the butter and inorganic salts, gives the amount of caseine and sugar.

When milk is adulterated, the adulterating material is almost invariably *water*. Books on this subject enumerate various articles which are sometimes added to milk, as chalk, sheep's brains, starch, flour, etc. That these substances have been *occasionally* though *rarely* used there is no doubt, though I have never been able to detect any of these substances. Chalk would readily be detected by its insolubility; starch by iodine; cerebral matter by the microscope, etc. It is extremely doubtful if any one, in this vicinity, at least, has ever made use of any of those unscientific and readily detected adulterations, which it has been so often asserted have been found in milk. Salt is

sometimes added to increase the specific gravity, which has been reduced by the addition of water. Burnt sugar is used to alter the blue tinge which watered milk possesses, and carbonate of soda to prevent souring, as has been stated; but beyond these, water is the only practical adulterant of milk. This adulterant, it is true, is not directly injurious, but it is no light matter to rob an important article of daily food like milk of a large portion of its nutritious constituents. As has been remarked, "milk, adulterated with water, is milk no longer; and, although the agent is of itself harmless, its use in this way is no less a grave offence both against the health and pockets of the community."

Water is detected by a comparison of the amount of the solid ingredients in the sample of milk examined and the amount in cow's milk of average quality. Pure cow's milk may be considered as having never less than 12.5 per cent of solid matter. If pure milk then contains 12½ parts solids, a sample of milk having less will contain only the percentage of pure milk expressed by the proportion the amount of solids in sample bears to 12½; the rest is added water. Thus, a pure milk containing water 87.5, solids, 12.5, if adulterated so that it contains only equal parts, pure milk and water, would give an analysis, water 93.75, solids, 6 25. The percentage of water in milk may also be determined from the amount of sugar contained in sample.

In closing, our acknowledgments are due to the courts, officers and others, for their coöperation in the objects and purposes of this office.

Respectfully submitted,

HENRY FAXON, *Inspector.*

City Hall, Boston, April 1, 1870.

With the Respects of Henry Hurd

City Document. — *No.* 24.

CITY OF BOSTON.



TWELFTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1871.

IN BOARD OF ALDERMEN, April 3, 1871.

Laid on the table, and ordered to be printed.

Attest:

S. F. McCLEARY,
City Clerk.

CITY OF BOSTON.

To His Honor the Mayor, and Aldermen of the City of Boston:

GENTLEMEN, — The undersigned respectfully submits the following report from March 31, 1870, to March 31, 1871, inclusive: —

The milk trade of Boston is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those persons who keep more than one cow, in the city proper, in the sixteenth Ward (Dorchester), Boston Highlands, South and East Boston.

Retail dealers are those who sell in small quantities from market places, stores, shops, and cellars.

The dealers in the sixteenth Ward (Dorchester) have been registered, and are included in this report.

Number of cows kept within the limits of the city of Boston	1,387
Viz: number in the city proper	34
Number in the sixteenth Ward, Dorchester	637
Number at the Boston Highlands	440
Number at South Boston	115
Number at East Boston	161
Number of persons who keep but one cow	323
There have been recorded the names and places of business of wholesale dealers in milk, since last report	198
Whole number of wholesale dealers registered	1,221

Whole number of wholesale dealers now in the business	501
Whole number of wholesale dealers now selling from carriages	246
Whole number of small wholesale dealers who keep more than one cow and sell to the neighborhood	255
Number of retailers of milk recorded since last report	159
Whole number of retail dealers in milk recorded to date	2,967
Number of samples of milk inspected since last report	1,700
Number not adulterated	1,090
Number more or less adulterated	610
Number of cases analyzed by chemist	20
Average amount of adulteration in the cases analyzed	32.40
Largest amount of adulteration (water intentionally added in 100 parts) in the cases analyzed	50.34
Least amount of adulteration (water added) in the cases analyzed	21.03
Whole number of samples of milk analyzed by chemist to date	253
Number of cases pending in the courts at the date of last report	4
Settled during the year favorable to the government	2
Number of complaints in the Municipal Court	6
Number convicted in the Municipal Court	6
Number of complaints to the Grand Jury	10
Number of bills of indictment by the Grand Jury.	10
Number convicted in the Superior Court	10
Whole number of complaints in court to date	206

Whole number convicted to date	135
Whole number not convicted	69
Number of cases now pending in the courts	2
Number of gallons for daily supply of milk for city of Boston	23,316
Daily cost to consumers	$7,927 44
Number of gallons for supply one year	8,510,340
Cost to consumers one year.	$2,893,515 60

The expenses of this office have been as follows, viz:

For the analysis of milk	$160 00
Stationery, record books, advertising, printing, etc.	147 98
Inspectors' small bills for assistance, lactometers, and other milk instruments,	27 35
	$335 33
For violations of the milk law there have been paid in the Municipal and Superior Courts, fines and costs amounting to	$502 33

The first act to punish fraud in the sale of adulterated milk was passed by the general court of this State during the winter of 1856.

This act gave *any person* the power to make complaint and to prosecute to final judgment in our courts, for violation of its provisions; but, as far as is known, no complaints were made.

To carry out the intent of this law, it was necessary that some person should be appointed who would devote his whole time and energies to the duties of the office, so as fully to meet the requirements of the act, and to protect the consumers of milk from imposition.

During the summer of 1858, much complaint was made by our citizens in regard to the gross adulteration of a large proportion of the milk sold within the limits of our city, and some of our physicians thought that the increased mortality of small children could be readily traced to this adulteration.

At the assembling of the general court in the winter of 1859, many interested parties, viz, citizens, milk producers, and some of the Boston milkmen, used their influence to cause a new law to be enacted, which should provide for the appointment of Inspectors of Milk, carefully defining their duties, etc. A law was readily passed, and it was approved by the governor, April 6, 1859.

On the 10th of August, 1859, the Boston office was established. At this time one or two inspectors had been appointed in some of the smaller cities, but only in connection with other duties, so that little or nothing had been done to carry out the requirements of the law. So far as we can learn, Boston was the pioneer in the establishment, on this continent, of an office exclusively devoted to the detection of, and conviction and punishment for, the sale of adulterated milk. To this end, during the past year, your inspector has given his time and attention to visiting private families, stores, and shops, and also the cars employed in bringing milk to Boston.

The following information, being useful from year to year, is inserted from my last report: —

"The contracts for the supply of milk are generally made twice a year, viz, on the first of April and the first of October.

"The milk cans used for the conveyance and sale of milk by the dealers are of two classes. The large cans, which hold nine quarts and a pint, are in general use by the milk trade of Worcester county, and by many of those who collect their milk in the towns in the vicinity of Boston. The small cans, which hold eight quarts and one-half pint, are mostly in use on the Fitchburg, Lowell, and Eastern railroads, and no milkman is considered equipped for business unless he is the owner of two or three full sets of cans, either eights or nines as above described, sufficient to contain the necessary milk for his daily route. One set being in use, while the others are on their way to the country for a fresh supply.

"Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans, to suit their customers; these are left within the houses, or at some designated place on the premises.'

April, 1870, was cold and stormy, with few exceptions, until the last week, when the weather became warm and pleasant.

The first of this month, considerable interest was manifested by those engaged in the milk trade in regard to the price of milk for the ensuing summer. It was finally decided that the price should be the same as it was last year, viz: at the farmer's door, from thirty-three to forty-two cents per can; at the depots in or near the city (after collecting and transporting it), from forty to forty-eight cents. This milk is sold to stores and shops at from fifty-four to sixty-two cents per can, and retailed in smaller quantities to families at eight cents per quart. The supply of milk, this month, was fully equal to the demand. The general inspection was commenced at the Boston Highlands, in stores and shops where milk is kept for sale, and the milk examined; records of which examinations are kept at the office of the inspector.

The quality of the milk in this section compares favorably with any part of the city, if we except the sixteenth ward. The stores and shops (and many of the families) obtain their milk from the same carriages that furnish families and stores in the south part of the city proper.

Although the first part of the month was cold and stormy, yet much less rain fell than usual at this season of the year.

May, 1870. The first part of this month the weather was warm, dry, and pleasant. The supply of milk in the city was about equal to the demand. The middle of the month brought a few cold, unpleasant days, with storms from the eastward.

Sunday, the twenty-first, was very hot; the thermometer stood at 84°, and the latter part of the month was remarkable for two or three days being unusually hot for the season.

By inspection in stores and shops at the north part of the city, the milk proved, with few exceptions, unusually free from adulteration. Almost daily during this month the services of the inspector were required in private families, in consequence of the milk being old when left, or destitute of cream, and sometimes a little extended; in all such cases visits are continued until the required improvement is established in the quality of the milk. A change of milkman in such cases works wonders in the improvement of the milk, and especially if he is plainly told the cause of his discharge; and his successor also made to understand why a change was made. If this plan were more readily adopted by families, there would be much less cause of complaint; but no, they are disposed to believe their milk as good as that of their neighbors, and that all Boston milk is more or less adulterated. The only way to be satisfied to the contrary, is to change the source of supply. By so doing, not only is the family benefited, but also the community. If a milkman finds that he is daily losing his customers in consequence of poor milk, he has the alternative, either to furnish a good article, or immediately dispose of his route.

The storms about the middle of the month were of short duration, and afforded but a limited supply of rain.

June commenced warm and pleasant, but soon changed to damp, foggy weather, with frequent rains and an occasional hot, pleasant day. This variable weather continued to the close of the month, remarkable for its copious rains, fogs, very hot days, frequent thunder showers, and a destructive hail storm.

This month the fields and pastures afforded an abundance of food for cattle, and the supply of milk more than equalled the demand; this, however, did not prevent complaints in regard to the quality. One of the milk stations was visited, and every can of one large dairy was found more or less extended by the addition of water; and by the return train, it was conveyed to the place whence it came. The return of this milk to the owner

caused much disappointment, as he had always prided himself on the richness and purity of his milk; and he talked long and loud against those persons found guilty of the crime of adulteration. It may have been in this case, — as facts have proved in others, — that this man was entirely innocent of any wrong, and that the mischief was done by some interested person in his employ. The law, nevertheless, holds the owner responsible for the quality of the milk sold from his place. The records of this office afford abundant proof in a number of cases, where milk, which came direct from the farms of some of our most reliable citizens, has been inspected and analyzed and found to have been more or less extended, — that in order to make up the deficiency in the milk, caused by the shrinking of the cows, they have *topped out* the cans with water, rather than have it known by their employers that the cows did not afford the former number of cans for the market. This has been admitted by employees themselves. When Boston milkmen extend their milk it is not done in the clumsy manner of adding more or less water to their cans, but on scientific principles, — by measure, — which measure is generally governed by the demand and supply of milk, and especially by a desire to obtain their extra profit by cheating that class of customers for which this milk is intended, many of whom are perfectly content with milk destitute of cream and extended by water to the amount of thirty-three per cent; while others are never satisfied with the quality of theirs, even when pure, and half cream at that.

July came in with cool, comfortable weather and frequent showers. The middle of the month was warm and pleasant, and there was an increasing demand for milk. The latter part of the month the weather was extremely hot and dry, so that even a few days wrought a great change in the increased demand and limited supply of milk.

During my visits of inspection, I found that many of the small places in various parts of the city, where milk was for-

merly sold, had abandoned the sale of milk in consequence of their being prohibited from the sale of liquor, the profit derived on the sale of the former being too small for an independent business. It was also found that the small profit derived from the sale of milk would not enable them to obtain ice at the exorbitant price then demanded so that the milk in a few hours after being left would be unfit for use. In the central part of the city, the shops and cellars where large quantities of milk were sold have been removed to make room for extensive improvements, and their occupants were frequently found engaged in the same business at the Boston Highlands, South and East Boston.

August commenced with dry, hot weather, increasing the demand for milk; the supply from the country becoming less, daily, as the pastures afforded but little, if any, subsistence for cattle. This scarcity of milk increased the adulteration by both farmers and milkmen, and not a few of the shopkeepers extended their small supply by rinsing out their milk-cans, while others would economize their small stock by selling a portion in the morning and the remainder at night. Some of the milkmen used the condensed milk, with the right proportion of water restored, and thus mixed it with the fresh milk received from the country.

This, for the time being, seemed to serve the purpose of supplying their customers and retaining their trade.

Some of the milk agents were enabled to procure from fifty to one hundred cans daily, which had been previously (when milk was plenty) sent to some one of the butter and cheese factories; but it cannot be presumed that milk of this quality would be used in any of the factories, and we must suppose it to have been prepared to meet the great want of milk in the Boston market. Some of this milk was brought direct from the cars to this office, and found to contain more than sixty per cent of added water. Again, a sample was analyzed by the

chemist, and found extended more than one-half. This milk caused serious trouble to some of those engaged in the sale, and the supply from this source was soon discontinued.

About the twentieth of the month, the weather became cooler, which lessened the demand for milk, and induced a corresponding improvement in the quality. The drought, however, continued, and the supply remained about the same to the end of the month.

September brought cooler weather with an occasional hot day, and a few short but refreshing showers. These did not much assist the pastures and fields in affording sustenance for cattle, but the cool weather lessened the demand for milk, and the daily inspection showed much less adulteration than the month previous; although the drought continued to the close of the month with a supply not equal to the demand.

During the latter part of this month a number of meetings were held by the milk producers, and others interested in the milk trade, to establish the winter price, the same to commence, as usual, on the first of October. It was thought by those who raise the milk that in justice to themselves, considering the advance in the value of cows, the cost of food and labor, the price of butter and cheese and other articles of family consumption, that the price of milk should for the winter months be increased so as to retail at ten cents per quart. Generally at this season of the year the supply of milk more than equals the demand, and extra quantities are not required as during the dry, hot summer season. It was finally decided at the meetings to allow the price to remain the same as the last winter, with the exception of continuing the winter price one month longer.

On the 29th of this month we visited places at South Boston where cows are kept; one of which contained eight. All were found in good condition with the exception of two, one of which was very lame and poor from the effects of a wound received in the early part of the season; the latter was very old, sick, and

with great exertion only, could move about. It was stated by the owner, at the time, that these cows gave no milk, but afterward he admitted that they afforded milk night and morning. By the combined efforts of the officer deputed to prevent cruelty to animals, and of your inspector, the milking was stopped and the cows slaughtered. A part of the former was used for food and the latter was buried.

October. The first part of this month brought frequent rains with moderate weather; the middle was pleasant; the latter part, with one or two exceptions at the close of the month, was pleasant. This month, if we except the last week, brought little if any increase to the quantity of milk, and some of the dealers were in a worse condition as to a supply than at any previous time during the season. It was said that some of the milk producers were not satisfied with the winter prices, and, at least for the present, retained the milk for the purpose of making their winter butter.

The last week of this month, however, the general supply of milk was more abundant, and most of the dealers were again enabled to supply their customers, and the general inspection in stores and shops at South Boston, with few exceptions, proved the milk to be quite free from adulteration.

On the first of this month, the winter contracts commenced at the following prices, being about the same as those of last year, viz.: from forty to fifty cents per can at the farmer's door; at the cars in this city, from fifty to sixty cents; delivered to stores and shops, from sixty-two to seventy cents; and retailed to families at nine cents per quart. In this month the cow-stables and cow-sheds at South and East Boston were visited, and found, with few exceptions, in fair condition, considering the limited space and the many unfavorable circumstances under which they are kept. Especially does this apply to South Boston; destitute of fields and pastures, they may be seen daily roaming about the streets unattended, on the sidewalks, and

into the gardens and yards, greatly to their injury and annoyance of our citizens, whose demands have been long and loud for an improvement in this matter. All parts of this section of our city have become so thickly settled that the cows cannot be kept within its limits to advantage.

November, with the exception of a few days, was moderate and pleasant; an occasional shower revived the pastures and fields so that they afforded more food and nourishment for cows than during some of the summer months. The annual thanksgiving served to increase the demand for milk; the dealers, however, readily obtained a sufficient supply to answer the wants of their customers. The supply of milk continued fully equal to the demand throughout the month, and but few complaints were made in regard to the quality.

The cows, and the general arrangements for their keeping were found much better at the Boston Highlands than in either South or East Boston. Many of the inhabitants supply themselves with milk, and have some to spare their neighbors.

In the sixteenth Ward — formerly Dorchester — there are nearly as many cows kept as in all the other wards combined, viz: six hundred and thirty-seven. One hundred and forty-three persons keep each but one cow, and one hundred and twenty keep two cows, or more, each. The facilities for keeping cows are, of course, better in this section than in any other part of the city. Many of the cows are of imported stock, justly celebrated for their milking qualities. The amount of milk which a cow will produce will depend on the breed and character of the animal, on the food supplied, and on general management.

There are very few milk dealers in this ward who distribute their milk to customers from carriages, except those who have small dairies of their own and serve private families.

The retail trade from stores and shops in this ward is limited to fifteen or twenty gallons of milk daily. The milk furnished

to customers is of good quality, and but few complaints have come from this ward during the past year.

December. The pleasant weather of last month continued till about the middle of this, when it became cold and blustering; but, as a whole, the month was remarkably pleasant for the season.

In general the supply of milk fully equalled the demand, and as usual when milk is abundant, a number of new routes were commenced by parties able to obtain a supply.

These parties, in order to obtain customers, often sell their milk at a reduced price, and to sustain themselves, resort to the skimming and watering process. This they continue until a scarcity of milk compels them to sell to other milkmen the few customers they have obtained, when they disappear from the business and are seen no more.

It is worthy of remark in this connection, that, whether it be old or new milkmen guilty of the practice of skimming and extending their milk, though they appear to prosper for a season, they are surely drifting to their inevitable ruin, and nearly all will gradually increase the adulteration, which act only serves to hasten to a final failure in business.

Many engaged in the milk trade urge as an excuse, that they are *obliged* to run their milk, as adulteration is termed, in order to enable them to successfully compete with others who do. They will, however, learn that dishonesty under any circumstance is not necessary to insure success in business. Here, as with every other class of adulteration, the offender degrades himself, wrongs his honest competitor, and defrauds the consumer.

There is another fraud practised by a few of our milkmen on the unsuspecting retailer of milk; and I know of no better way to give the correct idea of it than to quote the language generally used in such cases. The milkman enters the store and says to the proprietor, "I should like to supply you with

milk." He is answered, "I have a good milkman, who has supplied me for years, and I have no desire to change." The rejoinder is, "I raise the most of my own milk, and I can afford it to you for five or six cents per can less than you are now paying; and as you retail six or eight cans per day, I will give you *one hundred dollars* a year for your trade." The latter offer too often seals the bargain, the old milkman is discharged, and nothing remains to be done except to receive the hundred dollars and sign in presence of witnesses the contract prepared by the new man. For a short time quite a good article of milk is received, but its character is soon changed and his trade is found daily becoming less; the former customers supply themselves with milk elsewhere, and at the same time and place obtain their other articles necessary for family use. The seller now begins to realize the result of having sold himself for a trifle, and finds there is no way of escape, but to refund the money or violate the contract, and submit to a prosecution. More than one retailer of milk in this city has been nearly ruined in his business, by selling himself to one of these fellows, who are always prowling about in search of those whom they can rob and cheat.

January. The first part of this month was very pleasant, with few storms and a limited number of cold days. About the middle of the month the weather was dull, foggy, and variable, with a little rain; not sufficient, however, to raise the springs and ponds so as to afford an increased supply of water. The latter part of the month there were some very cold days and sufficient snow to make good sleighing to the close of the month. The supply of milk was abundant, with a limited demand. A large part of the surplus was sent to the butter factories in the country, and a portion was sold to parties in the city at a reduced price, to be made into butter; which business when milk is plenty is carried on quite extensively. The new disease among milch cows had a tendency to depress the milk

trade during the month. Many families discontinued their usual supply, fearing the bad results of diseased milk. Under all circumstances, persons should always refrain from using milk when the *taste* and *smell* are unpleasant; for although the cause may seem *comparatively* harmless, yet it may be at work on the milk and leading to dangerous results.

A number of samples were received at the office for inspection, all of which proved to be good milk, with the exception that some were old, which is not unusual at this season.

In February and March there is little demand for an extra quantity of milk, and this winter the trade was remarkably dull, especially in stores and small places, where, at other seasons of the year, the business increases, from the fact that it brings customers to the place for other articles which are in constant demand. There is no doubt that the cattle disease has created alarm in the minds of many, and had a tendency to embarrass trade, but as far as is known no diseased milk has been received within the city during the winter. Efforts, however, were made to obtain samples for the purpose of analysis, and to learn their true character, but without success.

The following extract from the able report of Dr. Oliver C. Wiggin, the founder of the office of Inspector of Milk at Providence, R. I., contains several useful hints to consumers of milk: —

"The nutritive value of milk, as compared with other kinds of animal food, is not generally appreciated. There is less difference between the economical value of milk and beefsteak (or eggs or fish) than is commonly supposed. The quantity of water in a good quality of milk is 86 per cent, in round steak 75 per cent, in fatter beef 60 per cent, in eggs about 68 per cent.

"From several analyses, made last winter, I estimate sirloin steak (reckoning loss from bone), at 35 cents a pound, as dear as milk at 24 cents a quart; round steak, at 20 cents a pound,

as dear as milk at 14 cents a quart; eggs, at 30 cents a dozen, as dear as milk at 20 cents a quart. Many laborers who pay 17 cents for corned beef would consider themselves hardly able to pay 10 cents for milk, when, in fact, they could as well afford to pay 15 cents. Milk is a most wholesome and economical food for either the rich or poor. It ought to be more largely used. If the money expended for veal and pork were expended for milk, I doubt not it would be an advantage both to the stomach and pocket, especially during the warm season. Relatively speaking, then, milk at 10 cents, or even 12 cents a quart, is the cheapest animal food that can be used.

"Whether farmers can afford to produce it cheaper, is a matter for them to decide. It is very probable that, were they to ask 12 cents, a very large number of poor people would refrain from its use, from mistaken notions of economy, notwithstanding they are excessive meat eaters."

The price of Milk. — The price averages about eight and a half cents a quart through the year (in summer, eight, and in winter nine cents). For a good article, this is certainly as reasonable as can be demanded. Such milk as many of our milkmen supply, would not be dear at 10 cents the year round, and some of our families so consider it, and have paid this price for years.

While many consumers regard the price of milk as already too high, most producers affirm that they do not receive a just compensation for their labor, and the capital invested.

At a meeting of the Milk Producers' Association of this State and New Hampshire, the subjects of the price of milk received by the producers, and the amount paid by the consumer, called forth considerable discussion, which led to the appointment of a committee to investigate thoroughly the whole subject, and report at a subsequent meeting.

It is evident that a large portion of the milk consumed in this city, comes to us the same as other farm products, which

pass through the hands of middlemen, much enhanced in price before reaching the consumer.

It has been suggested that the profits thus obtained by these middlemen should be divided between the producers and the consumer. If the former could send their milk, at their own expense, to several established depots, located in different parts of the city, the keepers of stores and shops, and all others who purchase milk by the can, would be enabled to obtain their supply at these places at a less price than has usually been paid.

The whole milk trade of Boston has always been conducted on a different system from that of any other city in this country (if we except Providence, R. I.). Whether any better plan can be devised and put into practical operation, which will better compensate the dairyman for his labor and capital invested, and at the same time afford the consumer good milk at a less price, experiment alone must determine.

A large proportion of the families in this city — rich or poor — receive their daily supply of milk from their milkman, by whom it is left in their houses, or, at an early hour in the morning, at some designated place on the premises; thus relieving the family from the trouble of visiting stores and shops for an article which can readily be furnished by the milkman.

It is a fact worthy of notice in this connection, that but very few of our Boston milkmen produce on their own farms the milk which they distribute to their customers.

Many of them obtain their daily supply at the milk stations at the termini of the railroads which bring the milk from the country. Others live but a few miles from the city, and at night go through their neighborhood, and collect a few cans in each place from small farmers; though some are supplied by quite large dairies. The price paid is such as the parties interested may agree upon, which price varies considerably, not only at different seasons, but in the same season in different neighbor-

hoods. This class of milkmen is mostly engaged in the family trade, and, as soon as their customers are all supplied, they return to their homes for the remainder of the day, where they continue the same routine of business (in which some of them have been engaged for the last twenty years).

Many of our citizens much prefer the milk produced in the neighboring towns and brought in by these men, to the railroad milk (as it is termed). Though the former, oftentimes, may be fresher than the latter, yet the railroad milk — produced by our distant New England pastures — cannot be surpassed in richness and flavor by any milk in this country.

We receive daily from Westboro' and the neighboring towns (*via* the Boston and Albany railroad) about two thousand five hundred cans of milk. This milk arrives in Boston during the night, and is ready for delivery at an early hour in the morning, to the milkmen, the latter bearing the expense of transportation; and they are held responsible to the farmer for his pay for the milk received.

There is, however, a separate car which arrives at the same time with the others, called the Milk Producers' Association car. This car was put in operation a few years since by some of the milk producers of Westboro' and vicinity, and their milk is sold to the milkmen at the depot at the general market price. There are no middlemen connected with this car and its arrangements, excepting those in the employ of the association. This system of the milk trade between the producers and the consumer appears about the same as that now under consideration, by the Committee of the State Milk Producers' Association. If this plan has proved successful, and to the general advantage of those who have tried the experiment, I can see no good reason why it should not be adopted by milk-growers in other sections of the country, wherever milk is raised and sent by railroad to supply the city of Boston.

The Fitchburg, Lowell, Hartford and Erie, and Eastern rail-

roads, bring us a large portion of the milk consumed in this city; and although some of it comes a long distance, the milk will generally compare favorably with any received, and is considered by a large class of our citizens, as good, fresh, family milk.

The general plan of conducting the milk business on these roads is different from that adopted on some of the others, viz: milk agents contract twice a year with the farmers for their milk (thus relieving them from the further care, except in receiving the price agreed upon, once a month). Milk collectors are employed by the agents to collect the milk from the farmer's door, and to deliver the same to the agent, at the door of the milk car. The agent remains on the train, in care of the milk, until its arrival at the depot in the city; and having received the milk account of his collector (and by the dairy marks on the cans), he knows every can of milk in the cars and from whom each came. The milkmen with their carriages are generally at the depot, ready to receive their milk, on the arrival of the cars, each one receiving from the agent, sufficient (if he can) to meet the wants of his customers; for which milk the agent receives his pay once a month. Some of this milk is distributed immediately, but by others, it is conveyed direct to their stables and is packed in ice (either in large chests, holding from twenty-five to one hundred cans of milk, or in their milk carriages), ready for delivery at an early hour in the morning.

Some of these men commence their labor as early as two o'clock in the morning, and in hot weather supply their customers twice a day. Many of them, having extensive routes, are obliged to keep two, and some of them three horses, to relieve each other in performing their arduous duties. The life of a Boston milkman is not to be envied by the uninitiated.

In all weathers, cold, hot or stormy, his customers are dependent on him for their daily supply of milk; and many of them, when pay-day comes, are either not to be found, or

ready to insist on a deduction being made in the amount of their milk bill. This is all very well, if they *know* that the milk which was received was either extended or creamed; but if not, there is no good reason why a milk bill should not be as honestly paid as any other.

It is of the utmost importance that a milkman should be not only kind and obliging, but just to his customers. Occasionally, from some of them, complaints, perhaps unfounded, become frequent, and he is informed that his milk is poor, thin, and half water, and that he need not trouble himself to leave any more. Now, the milkman knows whether he has left good milk or not. At any rate he is not disposed to lose a good customer and governs himself accordingly, by supplying the complaining parties their portion of milk from near the top of one of his large cans, which part may be nearly half cream. After the portion has been examined and tasted by the family, where it may be left, it is doubtful if any of it is used (and it may very likely be found at the Inspector's office in the early part of the day). In these cases the sample of cream milk is generally brought to the office by some member of the family, who commences thus, "If you examine this milk, must I tell you the milkman's name? He is a very clever man, and has left us milk for a number of years, and we don't want to hurt him; but a short time since he left us awful poor milk, more than half water, and we threatened to turn him away, and this is what he left us this morning, and were afraid to use it because we thought it was manufactured milk, — half chalk, or cornstarch, or arrowroot. On being informed that the sample contains none of these ingredients, but a large proportion of cream, and was probably taken from near the top of a large can, the visitor will retire, apparently satisfied.

Milk is often brought to this office and found more or less adulterated, and those interested refuse to give any information as to where it was purchased, or of whom, for fear of being summoned before a court of justice to testify.

There is now one of our Boston milkmen in the business who furnished milk to families previous to the establishment of this office in 1859. He visited the office in the fall of that year, about three months after it was opened, and stated that he was discouraged and thought he should be obliged to sell his route; for, said he, when this new milk law was enacted, I pledged myself that I would abandon forever the practice of extending and coloring my milk, and give my customers as good and as pure an article of milk as I could obtain from the country. I have done so, and the result is, I am losing some of my best customers almost daily.

They say my milk looks white and does not have its former rich appearance and flavor. I cannot tell them that I extended, colored, and salted their milk for years, and that they were now receiving a pure article of milk. There is proof that, if this man did lose a few customers by his honest dealing, he gained others, so that he was not obliged to discontinue his milk business and to sell his milk route.

In the winter of 1859, the legislature of this State enacted a law prohibiting the sale of adulterated milk. Chapter 206, section 5, of the laws of 1859, reads as follows: —

"No person shall offer for sale in this Commonwealth, milk produced from cows fed upon the refuse of breweries and distilleries, or any other substance which may be deleterious to the quality of the milk, under a penalty of ten dollars for each offence."

It was then, as now, the general practice of persons who kept cows and were within the reach of brewers' grains, to obtain these grains as auxiliary to other food. The injurious effects on the milk was supposed by many to be the same as that to those of cattle fed on the refuse of distilleries.

To carry out the intention of this law, a number of samples of milk was obtained from cows fed almost exclusively on brewers' grains, and these samples were analyzed by Drs. Hayes,

Carney, and others. The scientific results being obtained, prosecutions were commenced against persons for the violation of this law. Upon the unanimous testimony of these and other scientific parties, that the milk from cows fed on brewers' grains was not deleterious to the quality of the milk, in every case the defendants were discharged, and subsequently the law was repealed.

The law in regard to feeding cows on the refuse of distilleries in this State still continues in full force. We cannot believe, however, that any dairyman would make use of distillery slops, while good fresh brewers' grains can readily be obtained at ten cents per bushel, to an extent sufficient to meet the demand of all the small dairies, at least in the vicinity of Boston.

The principal part of the supply of milk for this city is raised beyond the reach of either brewers' grains or distillery slops; whereas, in some of our western cities, their milk is obtained from large dairies kept within their limits, or but a short distance from distilleries where the slops can readily be procured and used for producing milk. During the year, in some of these cities, this subject has aroused considerable attention, and their authorities have plainly seen the great importance of checking this evil.

This is not so easily done, when we consider its long standing, and the large amount of monied interest involved.

The subjects of feeding cows on the refuse of distilleries, and the injurious effects of the milk produced (sowing the seeds of disease and death as they do), have called forth a number of well-written articles from scientific men and others, who have dared to express their opinion against the practice, notwithstanding the personal influence and that of the capital invested in support of the continuance.

The seventeen hundred samples of milk inspected during the year, were found at the following places, viz: at the milk depots in this city, Charlestown, and at East Cambridge. (The milk

from these places is distributed within the limits of the city of Boston.) A large number of private families have availed themselves of the services of the Inspector; and more than one-hundred samples have been received at this office for examination, some of which came from families and others in the city, and some from the neighboring towns.

Stores and shops in the different wards have also received attention in regard to the quality of their milk.

The milk examined in private families, and that brought to the office, was supposed to be adulterated, otherwise the services of the Inspector would not have been required; therefore the seventeen hundred samples inspected, and the ten hundred and ninety found not adulterated, with the number of six hundred and ten that was more or less extended, does not give the actual amount of adulteration throughout the city.

In all the complaints carried before the courts during the year, for violations of the milk law, the parties pleaded guilty, paid their fine and cost, and were advertised, as required by the statute. Two of the milk cases which were pending at the date of my last report, have been settled favorably to the government, and there are two other cases of long standing, which are now pending in the supreme court, with good prospects of a favorable determination.

In the month of November, 1867, in the general inspection of milk in the twelfth ward, there was a number of stores and shops in which the milk was found more than usually extended by the addition of water. This was readily traced to one of the milkmen from a neighboring town. In more than one of these shops, at the time the milk was inspected, the keepers stated that their customers found much fault with the quality of the milk, which, on inspection, proved to contain about thirty per cent of added water. From some of these places samples of milk were taken, and were analyzed by the chemist, and complaints in court were instituted against the milkman, who

appeared, pleaded guilty, and paid his fine and cost. In due season the milkman presented to the keepers of these shops his milk bill for payment which was refused on the ground of adulteration. The milkman admitted that the milk samples which were analyzed were adulterated, but that, for this milk, he did not demand pay. For all other milk supplied he was determined that payment should be made; and to test the question, one case (which would settle all of them) was carried before the Municipal Court February 7, 1871. After hearing the evidence, the court was satisfied that notwithstanding the milk from this party's shop was not analyzed by the chemist as some of his milk was at other places (and generally found by the inspector adulterated), he was of the opinion that the milk left at this shop for which pay was demanded was more or less extended by water, and was, consequently, sold in violation of law; and a verdict was rendered accordingly in favor of the defendant.

This decision was an important one, as going to show that, if a milk dealer is in the daily practice of selling his customers adulterated milk, the amount of his milk bill is not recoverable in a court of justice.

The following communication in regard to milk and its adulteration has been received from James F. Babcock, Professor of Chemistry in the Massachusetts College of Pharmacy, who has made the analysis of milk for this city during the past year:

"Boston, March 28, 1871.

Henry Faxon, Esq., Inspector of Milk: —

Sir, — Herewith I enclose a tabular statement of the analysis of milk made from samples furnished by you during the year 1870–71, showing the amount of cream, fatty matter, and water in each sample, as well as the amount of water intentionally added, that is present as an adulteration.

The method of making these analyses is the same as that described in the report last year.

No adulteration has been found except water, with occasionally a little salt or caramel to slightly alter the color.

Analysis Mark & No.	Specific Gravity.	Cream.	Solids.	Water.	Percentage of water intentionally added in the samples.
No. 229.....	1.018		8.50	91.50	37.04
" 230.....	1.022	6 per cent.	9.60	90.40	28.88
" 231.....	1.027	6 "	10.00	90.00	25.92
" 232.....	1.020	7½	9.30	90.70	33.58
" 233.....	1.025	7½	10.20	89 95	27.15
" 234.....	1.026	6 per cent.	10.05	89.05	22.23
" 235.....	1.025	6.	9.2	90.8	31.86
" 236.....	1.022	3.5	8.9	91.1	34.07
" 237.....	1.020	3.	9.6	90.4	28.89
" 238.....	1.025	3.	8.7	91.3	35.56
" 239.....	1.025	5.	10.3	89.7	28.97
" 240.....	1.025	4.	10.48	89.52	27.72
" 241.....	1.026	6.	10.	90.	31.03
" 242.....	1.026	5.	10.05	89.95	30.70
" 243.....	1.023	5.	9.7	90.3	33.10
" 244.....	1.027	5.	11.45	88.55	21.03
" 245.....	1.027	3.	9.55	90.45	34.13
" 246.....	1.027	5.	9.92	90.08	31.59
" 247.....	1.024	2.	7.4	92.6	48.97
" 248.....	1.025	5.	10.88	89.12	24.97
" 249.....	1.026	7.	9.8	90.2	32.41
" 250.....	1.019	6.5	8.8	91.2	39.31
" 251.....	1.019	6.	7.2	92.8	50.34
" 252.....	1.029	3.	11.2	88.8	22.76
" 253.....	1.025	4.	8.9	91.1	38.69

I am not aware of anything new or interesting upon the subject of adulterated milk, although several valuable papers on this subject have been published the past year, in the *London Chemical News*, and the *American Chemist.*

Yours, respectfully,

JAMES F. BABCOCK,

Analyical and Consuling Chemist, No. 8 Boylston street."

In closing this report, I would acknowledge the kind assistance rendered by the prosecuting attornies and officers of the courts.

I also make my acknowledgments to James F. Babcock, Esq., chemist for this office, for his ready advice and valuable services; and to private individuals who have interested themselves in the furtherance of the objects of this department.

Respectfully submitted.

HENRY FAXON, *Inspector.*

CITY HALL, BOSTON, April 1st, 1871.

APPENDIX.

EXTRACTS FROM EXISTING LAWS IN RELATION TO THE SALE AND INSPECTION OF MILK.

SECTION 1. The mayor and aldermen of cities shall, and the selectmen of towns may, annually, appoint one or more persons to be inspectors of Milk for their respective places, who shall, before entering upon the duties of their office, be sworn. Each inspector shall give notice of his appointment by publishing the same two weeks in a newspaper, published in his city or town; or, if no newspaper is published therein, by posting up such notice in two or more public places in such city or town.

SECT. 2. The inspectors shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They may enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and, whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof and cause the same to be analyzed or otherwise satisfactorily tested, the results of which they shall record and preserve as evidence, and a certificate of such result sworn to by the analyzer, shall be admissible in evidence in all prosecutions under this act. The inspector shall receive such compensation as the mayor and aldermen or selectmen shall determine.

SECT. 3. Whoever neglects to cause his name and place of business to be recorded in the inspector's books, and his name legibly placed upon all carriages used by him in the convey-

ance of milk, before engaging in the sale thereof, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence, fifty dollars. And whoever offers for sale milk produced from cows fed on the refuse of distilleries, or any substance deleterious to the quality of the milk, or whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first, and fifty dollars for every subsequent offence.

SECT. 4. Whoever sells, or exchanges, or has in his possession with intent to sell or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall, for the first offence, be punished by a fine of twenty dollars, and for a second offence by a fine of fifty dollars, and for a subsequent violation, he shall be imprisoned in the House of Correction not less than thirty, nor more than ninety days. And whoever, in the employment of another, violates any provision of this section, shall be held equally guilty with the principal, and suffer the same penalty.

SECT. 5. Whoever adulterates, by water or otherwise, milk to be delivered for manufacture into butter or cheese, shall be liable to the penalties provided in the preceding section.

SECT. 6. It shall be the duty of every inspector of milk to institute complaint on the information of any person who shall lay before him satisfactory evidence on which to sustain the same.

SECT. 7. It shall be the duty of the inspector to cause the name and place of business of all persons convicted under section four and five of this act, to be published in two newspapers, printed in the town or county where the offence may have been committed.



City Document. — *No.* 40.

CITY OF BOSTON.



THIRTEENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1872.

CITY OF BOSTON, April 1, 1872.
Laid on the table, and 500 copies ordered to be printed.
Attest: S. F. McCLEARY,
City Clerk.

CITY OF BOSTON.

To his Honor the Mayor, and Aldermen of the City of Boston: —

Gentlemen, — The undersigned respectfully submits the following report from March 31, 1871, to March 31, 1872, inclusive: —

The milk trade of Boston is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those persons who keep more than one cow, in the city proper, in the Sixteenth Ward (Dorchester), Boston Highlands, South and East Boston.

Retail dealers are those who sell in small quantities from market places, stores, shops, and cellars.

Number of cows kept within the limits of the city of Boston	1,350
Viz.: number in the city proper	34
Number in the Sixteenth Ward, Dorchester	620
Number at the Boston Highlands	430
Number at South Boston	105
Number at East Boston	161
Number of persons who keep but one cow	320
There have been recorded the names and places of business of wholesale dealers in milk, since last report	60
Whole number of wholesale dealers registered	1,281

Whole number of wholesale dealers now in the business	514
Whole number of wholesale dealers now selling from carriages	266
Whole number of small wholesale dealers who keep more than one cow and sell to the neighborhood	248
Number of retailers of milk recorded since last report	80
Whole number of retail dealers in milk recorded to date	3,047
Number of samples of milk inspected since last report	2,006
Number not adulterated	1,395
Number more or less adulterated	611
Number of cases analyzed by chemist	29
Average amount of adulteration in the cases analyzed	21.77
Largest amount of adulteration (water intentionally added in 100 parts) in the cases analyzed	54.23
Least amount of adulteration (water added) in the cases analyzed	10.37
Number of samples analyzed, including above, and not adulterated	4
Whole number of samples of milk analyzed to date	282
Number of cases pending in the courts at the date of last report	2
Settled during the year favorably to the government	1
Number of complaints in the Municipal Court	11
Number convicted in the Municipal Court	11
Number of complaints to the Grand Jury	7
Number of bills of indictment by the Grand Jury	7

Number convicted in the Superior Court .	7
Whole number of complaints in court to date	222
Whole number convicted to date . . .	154
Whole number not convicted . . .	67
Number of cases now pending in the courts .	1
Number of gallons of daily supply of milk for the City of Boston	24,009
Daily cost to consumers	$8,163.06
Number of gallons for supply one year . .	8,763,285
Cost to consumers one year . . .	$2,979,516.90

The expenses of this office have been as follows: —

Viz.: For the analysis of milk . . .	$270.00
Stationery, record books, advertising, printing, etc.	223.10
Inspector's small bills for assistance, lactometers, and other milk instruments . .	27.78
	$520.88
For violations of the milk law there have been paid in the Municipal and Superior Courts fines and costs amounting to . . .	$791.67

The duties of this office have greatly increased within the past three or four years, not only by reason of annexation of Roxbury and Dorchester, but also from the interest which the subject of the adulteration of milk has awakened in the minds of our citizens, which has led large numbers to avail themselves of the services of the Inspector. Private families, stores, shops, and the milk stations, have received constant attention; and those interested will bear their testimony to the aid and assistance that have been rendered by this office during the past year.

A large proportion of our milk is distributed to the customers, by the milkmen, between the hours of 4 and 10 o'clock A.M., and it is important that the Inspector should be attending to his duties in those hours, otherwise he cannot know the quality of the milk left.

The general inspection of milk in stores and shops (where no complaint is made) must be attended to in the forenoon, as most of their customers are supplied in the early part of the day.

The milk law provides that Inspectors shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk, within their limits, and proper books of account and record of all matters pertaining to the office. To this end the hours from two to five o'clock P.M. are devoted to the hearing of complaints in regard to the quality of the milk supplied, and also to receiving visits from parties interested in the milk trade of Boston.

Judging by the experience of the past two or three years, with our increasing population, the time is not far distant when additional assistance will be required in this office, more effectually to keep in check an evil which concerns the health of every family in the community.

The establishment of this office — the first exclusively devoted to the detection of, and conviction and punishment for, the sale of adulterated milk — has awakened in other parts of the country a lively interest in the subject; so that lengthy communications are almost daily received at this office, and many strangers sojourning with us for a short season visit the office for information.

A number of large cities south and west have availed themselves of our experience, and have established similar offices, which are now in successful operation.

The following information, being useful from year to year, is inserted from my last report: —

"The contracts for the supply of milk are generally made twice a year, viz., on the first of April and the first of October.

"The milk cans used for the conveyance and sale of milk by the dealers are of two classes. The large cans, which

hold nine quarts and a pint, are in general use by the milk trade of Worcester county, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans, which hold eight quarts and one-half pint, are mostly in use on the Fitchburg, Lowell, and Eastern Railroads, and no milkman is considered equipped for business unless he is the owner of two or three full sets of cans, either eights or nines, as above described, sufficient to contain the necessary milk for his daily route, one set being in use while the others are on their way to the country for a fresh supply.

"Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers."

The subject of requiring that cans used in the wholesale trade, for the sale and conveyance of milk, be of a uniform size, and sealed as a measure, has nearly every season, for the past ten or twelve years, engaged the attention of our Legislature; and there seems to be no sufficient reason why milk cans should be exempt from the restrictions placed upon other measures in daily use. It has often been contended that milk cans are not used as measures, but are only of a convenient size for the transportation of the milk, which is bought and sold by the can, without regard to the quantity which the cans hold.

These cans, of a different size, may be found in stores, shops and every place where the milk trade is carried on; and most persons who sell or buy milk from these cans, year after year, are disposed to believe that it makes to them quite a difference whether the cans hold nine quarts and a pint, or only eight quarts and one-half pint.

It is evident that the time is not far distant when a law to remedy this defect will be enacted and enforced, which will be

greatly to the advantage of not only the milk producer, but all others engaged in the milk trade.

In the retail trade of milk, many of our families prefer to receive their daily supply in small cans of a size to meet the wants of the family. To this arrangement none can object, provided the cans are sealed, showing the quantity which they hold.

The price of milk last summer was about the same as in the year previous, viz. : At the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-eight cents. This is sold to stores and shops at from fifty-four to sixty-two cents per can, aad is retailed in smaller quantities to families at eight cents per quart.

Although the above prices are such as were generally agreed upon, yet many of the milk dealers, owing to the great competition in the trade, would buy and sell their milk at greatly reduced prices, governed only by supply and demand, the same as with other articles of family consumption.

During the last summer a number of stores and shops were found which were supplied with good pure milk at forty cents per can, and families at six and seven cents per quart.

April, 1871, commenced with warm, pleasant weather, with an increasing demand for milk. Cold or hot, wet or dry weather seriously affects the supply as well as the demand, and often the quality is entirely changed by the sudden variations in our climate.

The middle of this month brought us considerable dull, unpleasant weather, with but little rain.

The supply of milk fully equalled the demand, and the summer prices as arranged, appeared to give general satisfaction to those engaged in the trade. The last of this month afforded us a long, cold, north-east storm, with copious rains.

During this month the Inspector's time was devoted to the

general inspection of the milk at the Highlands, in stores and shops; and a number of private families, at their request, were visited in regard to the milk.

In some of these places the milk was found far below the standard, and a number of the milk-and-water fraternity were introduced to "His Honor," the Judge of the Municipal Court, in whose opinion it was a heinous crime to adulterate milk, and who felt it his duty to sentence the violators of the law accordingly.

A number of the cow-stables and cow-sheds at the Boston Highlands were likewise visited, and the arrangements generally for the keeping of cows were found much better than either at South or East Boston.

May, 1871. On the third of the month commenced a cold north-east rain-storm, which continued more or less violent until the sixth, when the earth had become well saturated with water.

The middle of the month was, with few exceptions, cool and pleasant, with an abundant supply of milk. The latter part was dry, with cool nights and mornings, if we except the 30th day, which was very hot.

The general supply of milk fully equalled the demand; but the average quality of the article at the north part of the city showed more adulteration than in the corresponding month of last year.

About the first of this month, Messrs. Smith, Page & Co., with Mr. William R. Inman as agent, started a new milk car on the Eastern Railroad, with a terminus at East Boston.

This car brought daily between two and three hundred cans of milk from North Hampton, Hampton, Greenland, Stratham and Rye, — towns in Rockingham County, New Hampshire. This milk, for purity and richness, was fully equal to the best received within the limits of the city. During this month more than one hundred cans were inspected, before their removal from the cars, and, with the exception

of five or six cans, the milk was found as it should be, pure and good. It is well known, however, that the quality of some of it was often materially changed previous to its being delivered in stores and families.

Nevertheless, at the general inspection of the milk at East Boston in the month of September, places were found, even after the milk had passed through the hands of the milkmen, of the same good character as when examined on the cars.

June, 1871. The first part of this month was warm and pleasant, with an occasional sultry, hot day, and sufficient rain to keep vegetation in good growing condition.

The supply of milk was sufficient for all demands. On the eighteenth and nineteenth of this month, a cold north-east rain-storm greatly assisted the prospect of an average crop of grass, which, owing to the small amount of rain last month, it was feared would fall short.

The month closed with fine, cool, pleasant weather, and with milk enough to meet the wants of consumers. During this month the general inspection of milk in stores and shops was at the western and central parts of the city; and the milk was found to compare favorably with that of former years; nevertheless extended milk was found in some places, and where sufficient evidence could be obtained complaints were made to the courts, which, with one exception, were settled favorably to the government.

Visits were made this month to the milk stations, on the arrival of the cars from the country, and the milk was examined, but it was not always found extended to the amount expected by the parties interested as complainants. In some cases, however, it was clearly shown that cans of milk may be *topped* out with a little water previous to delivery to the consumer, without assistance from their milkman.

July, 1871. As is usual, at this season, many families left the city for more genial resorts in the country, which

considerably reduced the demand for milk; and the supply from the country during the first part of the month was sufficient for the demand.

The middle of the month was hot and dry, and even a few days wrought a great change in the supply of milk. The hot weather increased the demand. A few small showers afforded but little relief, and from some parts of the country the supply of milk was very limited.

On the fourteenth and fifteenth of this month, Port Norfolk and Neponset were visited, and the milk was found good, supplied, by two or three men, from carriages. There are, however, a few persons who keep cows and sell to the neighborhood.

The latter part of the month gave us cool, pleasant weather, with some rain, which assisted in lessening the demand for milk, so that generally the dealers could again meet the wants of their customers.

On Monday, July 10, at 4 o'clock A.M., the Inspector visited the neighborhood of Essex street, and found there a milk carriage standing near one of the tenement houses, from which the proprietor of the carriage soon emerged with a large milk can, containing about one quart of milk.

This appeared to be a favorable opportunity to test the quality of his milk; and to this end the Inspector made an attempt to obtain a sample. To this the man objected, and said that milk was short with him, and that what he had was Sunday's milk, bought of other parties on the street. These excuses only made it more apparent that the milk which he had been selling to these poor people was not only badly adulterated, but that he knew it to be so at the time of sale. A sample was taken from this can, and the analysis showed that water had been intentionally added to the extent of 54.23 in one hundred parts; and that only 4 per cent. of the compound was cream. Well might some of his poor customers this morning exclaim, "*Why, it took more than a pint*

of his milk to color a cup of tay!" The good results of this morning's labor did not end with the payment of a fine and cost; for some of his customers afterwards stated that through the summer they received of this man quite good milk.

Friday, July 28th, in the afternoon one of our citizens visited the Inspector's office, and stated that an infant child of his was sick, and had been so for some time; that by the advice of friends he had obtained from one of his neighbors, who kept one or two cows, a supply of milk for the child; but the child did not improve as the family had reason to expect, and some of them were disposed to believe that the milk was adulterated, as it failed to afford the required nourishment.

He was advised by the Inspector to be present when the milk was brought to the house that night, and to retain the same in his possession until 9 o'clock P.M., at which time the Inspector would be there to receive it. It was then and there received and examined, and, the day following, analyzed by the chemist, and found to contain 26.30 parts of water in one hundred parts, intentionally added, and only 6 per cent. of cream. When the time arrived for this case to be presented to the Grand Jury, for some reason unknown the principal witness was not present to testify; but the Inspector was present, and the jury did not hesitate to find a bill of indictment against the defendant, who was brought into the Superior Court, pleaded guilty, and paid his fine and cost, and was advertised in the newspapers as required by the statute in such case made and provided.

The child died about the middle of September following. It may here be observed that this is only one of many similar cases to which the attention of your Inspector is called. There are others in the community besides this bereaved family, who think there is too much sympathy and tender

regard for "*respectable*" criminals, in the hearts of our people.

There are laws enough, and officers to enforce them, but it is not often that violators of the law are looked upon by the community as they should be, and punished as they deserve.

It is well known that the articles used in the adulteration of milk are not *in themselves* injurious to health, but, when placed in milk, the character of the milk is so far changed that it does not afford the nourishment required.

The Inspector is often called to private families in regard to the milk, where the physician recommends the infant's milk to be diluted with water before feeding. If it is pure, rich milk, this may be necessary; but it is not often that the article furnished by the milkman, however free from adulteration, is any too rich for even the infant stomach.

In this connection it may be of service to families to know that very many of our physicians highly recommend the condensed milk for infants.

This article is prepared by the "Lewis Brothers," of this city, and sold in hermetically sealed cans, samples of which have been analyzed by the city chemist, and found to be a pure compound of rich cream and granulated sugar, which can be diluted with water to suit the taste of the parent, and the necessary wants of the child.

August, 1871. The first part of this month the weather was variable, with some hot, sultry days, and frequent rains. The supply of milk was very limited, and the unfavorable weather for keeping it created an unusual scarcity. Considerable adulteration to the milk was found in stores and shops, and many of the private families would plead for more, without regard to the quality; but the dealers found it impossible to supply it at any price. About the middle of the month the weather was cooler, with an occasional hot, sultry day, and but little rain; the milk trade continued about the same as it had been. The weather in the latter part of the month

was generally cool, with frequent rains, and closed with a short supply of milk.

During this month a number of complaints to the courts were made against persons for selling extended milk, all of which were settled favorably to the government.

September, 1871, opened with fine, cool, pleasant weather, and the milk trade gradually improved, so that many of the larger dealers were again enabled to furnish their customers with their usual supply. The middle of the month was very cold for the season, with short storms from the north-east, and an occasional moderate, pleasant day.

On the 16th, an adjourned meeting of the Milk Producers' Association, and the Association of Milk Agents and Dealers, was held at the Quincy House in this city.

After a long discussion in regard to the price of milk for the ensuing winter, it became more and more evident that the two parties would not agree upon a price, the producers demanding fifty cents per can, while the contracting agents and dealers were disposed to pay only forty-five cents. Pending this question the convention was dissolved.

The last few days of the month were pleasant, very cool, and without rain, but with a fair supply of milk.

The general inspection of milk this month was at East Boston, in stores and shops, and some private families, at their request.

Some complaints were made to the courts against the violators of the milk law, but, generally, in places visited, the milk was found quite free from any adulteration.

In visiting different parts of this ward in regard to the milk, an opportunity was afforded to visit the cows and the places where they were kept, which, with one or two exceptions, were found in good condition; probably owing to the strict watch kept over their owners by the officers in charge for the prevention of cruelty to animals.

October, 1871. With few exceptions, the first part of this

month was cool and pleasant, with an occasional dull, lowery day, and but little rain.

The general inspection of the milk was at South Boston, where the milk has proved better in former years than in any other section of the city, if we except the Sixteenth Ward. But this season the scarcity of milk appeared to be owing to the failure of establishing a satisfactory winter price.

For the first week of the month some of the milk dealers were hard pressed to supply the wants of their customers, and the milk furnished to stores and shops was found inferior to any examined in other parts of the city during the summer months.

It was said that some of the milk producers, in consequence of the low price, as they considered it, offered by the contractors, had refused to market their milk, as it would not pay to raise milk through the winter at the price offered for it.

So far as the milkmen and their customers were concerned many of them adopted the last winter prices, while others sold their milk at a small advance on what they received last summer; but nearly all the retail trade to families was for nine cents a quart.

The middle of the month afforded considerable dull weather, with some rain, and a few pleasant days.

The inspection of the milk at South Boston was continued, but without showing much change for the better. The cow-stables and cow-sheds were visited, and found, with few exceptions, in fair condition, considering the limited space and the many unfavorable circumstances under which the cows are kept.

The latter part of the month gave us considerable rain, with wind from the north-east, and variable weather ; some days were quite cold and blustering, others moderate and pleasant.

The month closed more favorable as to the demand and

supply of milk, and the record of examinations at Washington Village was more satisfactory than at any previous time during the month.

November, 1871. The weather during the first ten days of this month, with few exceptions, was fine and pleasant. Although the contracting parties had failed to establish the winter price for milk, yet sufficient was received at this time to enable the dealers, generally, to meet the demand, and a better state of things existed than at any time during the last month.

The middle of the month, with the exception of a few days, was dull and stormy, with high winds and considerable rain.

The milk producers and contractors came together again, and it was said they agreed that on and after the first day of December, 1871, to the first day of April, 1872, the price of milk should be the same as for last winter, viz., fifty cents per can, delivered in Boston or Charlestown.

Subsequent events, however, proved that, if the above arrangement was agreed upon in regard to the price, it was not satisfactory to both parties; for in the month of January, another meeting was held at the Quincy House, by the milk contractors, the object of which was to reduce the price of milk during the winter months.

From the twentieth to the close of the month the weather was variable, with considerable rain and a number of very cold days. The supply of milk was again interrupted, and not sufficient quantity was received for the wants of the people, while the annual Thanksgiving served still more to increase the demand.

December, 1871, with the exception of a few days, was very cold and blustering, accompanied by some rain and snow.

During the first part of the month there existed with some of the dealers considerable trouble in obtaining a sufficient

supply for their customers. On the fifth of the month another meeting was held by the Producers' Association, in regard to the winter price of milk.

The month closed with a supply fully equal to the demand.

The month of December was, as a whole, a very cold month; it was the coldest December in Boston for thirty years or more; more severe than the two succeeding, and commonly colder months, January and February.

January, 1872, to the middle of the month, with few exceptions, afforded pleasant moderate weather. Another meeting of the Milk Contractors' Association was held at the Quincy House, in regard to the scale of prices. The supply of milk at this time appeared more than equal to the demand, and the trade by many of the dealers was considered very dull, which is usual during the winter months; whereas in summer, and especially in hot weather, milk is freely used, and forms an important item of family consumption, and scores of laborers may be seen in stores and shops, drinking good cool milk in preference to either beer or whiskey.

The latter part of the month was very pleasant winter weather, with but little snow or rain, and there was a good supply of milk.

February, 1872. The weather during the first three weeks of this month was remarkable for its mildness, its freedom from storms of any sort, snow, rain, or wind, and its uniformity, its many successive bright, unclouded days.

From the most reliable information that could be obtained from those engaged in the milk trade it appears that the supply during the month was more than enough to meet the demand.

The weather of the last week of the month was very blustering, cold and severe; in fact, the hardest to bear of the whole winter.

March, 1872. The first of this month was attended by very cold and severe weather, colder than at any time during the

winter months, the prevailing winds being from the west and north-west, with neither snow or rain.

On the fifth a meeting was held at the Quincy House by the Milk Producers' Association, at which a number of contractors were present. It was agreed, that the price of milk from April first to October first next, should be forty cents per can at the cars, and eight cents per quart at retail; and that the price, delivered at each station on the railroad, and in the country, by the producers, should be communicated in a circular, on or before March 15th.

The middle of the month was alternately cold and moderate, with some snow and rain. The differences existing among the associations interested in the milk trade of Boston has had a tendency to lessen the supply, to a degree unusual at this season of the year.

The month as a whole partook very much more of the character of winter than either of the three months of winter preceding; it was the coldest month of March for a period of at least fifty, perhaps a hundred years; and was more like winter than the average of winter months in this part of the country.

There are many persons in this city, and not a few in the country, who are disposed to believe that all *milkmen* are dishonest, and that they never furnish, to either families or stores, a pure, unadulterated article of milk.

For information on this point, your Inspector was requested in course of the season to cause the analyses of a few samples from private families, stores, and shops, to be made, so as to asertain the general amount of adulteration.

The samples from private families were supposed to be adulterated when received for analysis, and the milk taken from stores and shops was for sale upon the counter at the time the samples were taken.

DATE.	WHERE FROM.	Cream.	Solids.	Water.	Added Water.
April 11, 1871.	Private family.	6 per ct.	11.55	88.45	20.35
April 18, "	Bread and cake store, B. H'lds.	12 per ct.	14.90	85.10	00.00
May 18, "	Small shop, North end.	10.05	12.00	88.00	11.11
May 18, "	Small shop, Boston Highlands.	6 per ct.	11.35	88.65	21.73
May 27, "	Small shop, North end, Boston.	8 per ct.	11.04	88.06	15.56
July 7, "	Cellar on Cove street, Boston.	5 per ct.	10.67	89.33	20.96
July 27, "	Fine large grocer.		11.31	88.69	16.24
July 27, "	A poor family.		13.60	86.40	00.00
Aug. 12, "	Common store milk.	13 per ct.	12.01	87.09	10.37
Aug. 24, "	From a small shop.	7 per ct.	10.06	89.40	21.48
Nov. 9, "	Private family.	14 per ct.	18.51	81.49	00.00
Jan. 2, 1872.	Private family.	13 per ct.	14.90	85.10	00.00

A meeting of persons interested in obtaining pure milk, was held in Boston, Tuesday, February 13th. An account of this meeting was published in all the daily papers of the city. The reports of this meeting represented the several speakers as stating that all the milk furnished the citizens of Boston was grossly adulterated; and in reply, the following letter from James F. Babcock, chemist, to this department, was published in the Boston "Daily Advertiser," and copied into the other papers: —

"PURE MILK.

"TO THE EDITORS OF THE BOSTON DAILY ADVERTISER: —

"While I sympathize most heartily with the movement to secure pure milk, an account of which appeared in your issue of the 14th, I feel that it is due to the public that I should correct certain erroneous statements there made, — statements calculated to convey a

false impression in relation to the purity of the milk sold in our city.

"In your report of the formation of an association to secure good milk, the statement is made by a committee, that milk 'is adulterated, not merely with water but with deleterious substances;' and again, in the heading of the subscription paper, the following language occurs: 'The artificial color, the added sweetness and deleterious ingredients are so carefully blended, that many persons actually prefer the prepared mixture,' etc.

"I have analyzed all the milk found by the Inspector of Milk of the City of Boston — Mr. Henry Faxon — to be adulterated, during the past three years. I have made a complete analysis of more than one hundred samples of adulterated milk during this time, and the result of these analyses enables me to say that I have failed to find any adulterations whatever, except water, caramel, sometimes a little salt, or perhaps bicarbonate of soda, to prevent souring. I have *never* found any *deleterious ingredients carefully blended.* The milk was diluted with water colored with caramel or burnt sugar, perhaps a grain or two in a pint. This is not deleterious, any more than so much molasses.

"The reports of the Department of Internal Health of New York City, fully confirm my statements. The analyses of Dr. White of this city and the late Charles T. Carney, on file at the Inspector's office at City Hall, still further prove the facts stated. Sheep's brains, chalk, flour, starch, poisonous or deleterious substances, so often alluded to in sensational articles on adulteration, are not practically employed for nor are they adapted to the adulteration of milk.

"Water, to the extent of twenty, and as I have sometimes found it, sixty per cent. as an adulteration, is bad enough; but let us not frighten ourselves by making it appear worse than it is.

"Yours respectfully,

"James F. Babcock,

"*Analytical Chemist to the Department of Internal Health,*

"*City of Boston.*"

When families return to the city after a sojourn in the country, they at once notice the difference in the quality of

their milk, and it is difficult for them to believe even the certificate of the chemist as to its purity. It is well known that the quality of the milk depends upon the percentage of cream which it affords and the solid matter which it contains.

Generally, cows which are kept for *family use* are of that class which afford a medium quantity of milk, which is rich in cream. But where marketing the milk is an object, and cows are kept more especially for the improvement of the farm, it is certainly more profitable for their owners to have cows which will produce the largest quantity of milk, without regard to its quality.

Hence it is, that not a little of our milk, when distributed to the consumer, however pure it may be, is poor and thin, and has the appearance of having been deprived of a portion of its cream, when in reality its quality is the same as when drawn from the cow.

A great mistake is made by the friends of reform in the milk trade, whether they are in bodies or individually, in seeking changes of the law to remedy some particular or fancied irregularity.

These changes work mischief both to dealer and consumer, and, when frequently made, defeat the objects of all law in relation to this vital subject. People hardly become aware of the existence of a particular section, before it is stricken out, and the dishonest dealer who has experienced one conviction escapes the extreme penalty of a second offence.

Since 1859, several enactments in relation to milk have been passed. That of 1864 proved very effective, but influence was successfully brought to bear for its modification, and it was rendered ineffective in certain respects. Two or three changes occurred before 1868. At this time the penalties were greatly increased, and it was thought that if the *informer* of the violators of the law should receive *one-half* of the penalty upon conviction of the offender, it would

effectually answer the purpose for which the law was enacted.

Under this law a number of complaints were made to the courts, with but poor success. Two, however, were sharply contested, and after vibrating for nearly *four years* between the Superior and Supreme Courts, one of them has recently been settled in favor of the government; the other is still pending.

It is a well-known fact that penalties, if they are severe, do not generally meet the approval of the community, nor of juries, so as to secure conviction. Again in the winter of 1869, influence was brought to bear upon the law, when the act of 1864 was partially restored, and has since been instrumental in driving unscrupulous men out of the business. It is to be hoped that the present stringent law will be retained.

"BOSTON, March 28, 1872.

"HENRY FAXON, ESQ., *Inspector of Milk:* —

"SIR, — Herewith I enclose a tabular statement of the analyses of milk made from samples furnished by you during the year 1871–72, showing the amount of cream, fatty matter, and water in each sample, as well as the amount of water intentionally added, that is present as an adulteration.

Analysis No. and Mark.	Specific gravity.	Cream.	Solids.	Water.	Per cent. of added water in sample.
No. 254....	1.030	6 per cent.	11.55	88.45	20.35
" 255....	1.030	9 "	11.30	88.70	21.80
" 256....	1.033	12 "	14.90	85.10	00.00
" 257....	1.030	7 "	10.04	89.06	28.28
" 258....	1.027	6 "	11.35	88.65	21.73
" 259....	1.027	10.05	12.00	88.00	11.11
" 260....	1.030	8 per cent.	11.04	88.06	15.56
" 261....	1.025	4 "	9.9	90.1	26.67
" 262....	1.024	5 "	9.15	90.85	32.23
" 263....	1.027	4 "	9.9	90.1	25.00
" 264....	1.027		11.23	88.77	25.58
" 265....	1.025	4 "	10.00	90.00	25.93
" 266 ...	1.025	5 "	10.67	89.33	20.96
" 267....		4 "	6.18	93.82	54.23
" 268....			11.31	88.69	16.24
" 269....			13.60	86.40	00.00
" 270....		7½ "	10.10	89.90	25.18
" 271....		6 "	9.95	90.05	26.30
" 272....		5 "	9.83	90.17	27.23
" 273....	16 by Lactometer.	13 "	12.01	87.09	10.37
" 274....			9.03	90.07	31.11
" 275....			8.09	91.01	34.07
" 276....	1.027	5 "	9.07	90.03	28.15
" 277....	1.025	7 "	10.6	89.40	21.48
" 278....	1.025	1 "	9.6	90.40	28.88
" 279....	1.030	7 "	10.03	89.70	28.96
" 280....	1.033	14 "	18.51	81.49	00.00
" 281....	1.027	6 "	11.00	89.00	24.08
" 282....	1.032	13 "	14.90	85.10	00.00

"The method adopted in the analysis is the same as that described in your previous reports. I have found no new adulteration; water, caramel salt, and carbonate of soda, being the only substances ever used for this purpose. The statements circulated by the 'Milk Consumers' Protective Association,' in regard to the *deleterious* and *dangerous* adulterations practised upon milk, and their assertions calculated to convey the impression that all, or nearly all, the milk which comes into Boston is adulterated, are without foundation. The object of this Association is a worthy one, and deserving of success, but when statements contrary to known facts are persevered in for sensational purposes, to induce

people to obtain their milk through such an agency, the respect and support due the Association must, by all conscientious persons, be withdrawn.

"Yours truly,

"JAMES F. BABCOCK,

"*Analyst to the City of Boston.*"

In closing this report, your Inspector would acknowledge the hearty co-operation of the prosecuting attorneys, and the other officers of the courts. Their efforts have greatly contributed to the successful enforcement of the law, and consequently to the advantage of the public.

I desire also to express my sincere thanks to James F. Babcock, Esq., chemist to this department, for his prompt and careful attention to the analyses of milk, notwithstanding the many calls upon his time by his professional duties elsewhere.

Respectfully submitted,

HENRY FAXON,

Inspector.

CITY HALL, BOSTON, March 31, 1872.

APPENDIX.

THE MILK ACT OF 1869.

An Act to Prevent the Sale or Exchange of Adulterated Milk.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows: —

Section 1. Whoever sells, or changes, or has in his possession with intent to sell or exchange, or offers for sale or exchange adulterated milk, or milk to which water or any foreign substance has been added, shall, for each offence, be punished by a fine not less than twenty, nor more than one hundred dollars.

Sect. 2. Whoever adulterates, by water, or otherwise, milk to be delivered for manufacture into butter or cheese, shall be liable to the penalties provided in the preceding section.

Sect. 3. It shall be the duty of every Inspector of Milk to institute complaint on the information of any person who shall lay before him satisfactory evidence on which to sustain the same.

Sect. 4. Chapter one hundred and ninety-four of the acts of the year eighteen hundred and sixty-five, and chapter two hundred and sixty-three of the acts of the year eighteen hundred and sixty-eight, and all other acts, and parts of acts, inconsistent herewith, are hereby repealed, but such repeal shall not affect any prosecution now pending.

Sect. 5. Each Inspector of Milk in this Commonwealth is hereby required to cause the provisions of this act to be published in his town, at least three times, by publication in some newspaper, printed in said town, or some newspaper in the county in which the town is situated.

April 10, 1869.

Approved: WILLIAM CLAFLIN.

3574.5

City Document. — *No.* 56.

CITY OF BOSTON



FOURTEENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1873.

CITY OF BOSTON.

To his Honor the Mayor, and Aldermen of the City of Boston: —

Gentlemen, — The undersigned respectfully submits the report of his department for the year commencing April 1, 1872.

The milk trade of Boston is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those who keep more than one cow, in the city proper, in the Sixteenth Ward (Dorchester), Boston Highlands, South and East Boston.

Retail dealers are those who sell in small quantities from market places, stores, shops and cellars.

Number of cows kept within the limits of the city of Boston	1,319
Viz.: number in the city proper	30
Number in the sixteenth ward, Dorchester	608
Number at the Boston Highlands	423
Number at South Boston	100
Number at East Boston	158
Number of persons who keep but one cow	307
There have been recorded the names and places of business of wholesale dealers in milk, since last report	46
Whole number of wholesale dealers registered	1,327
Whole number of wholesale dealers now in the business	527

Whole number of wholesale dealers now selling from carriages	276
Whole number of small wholesale dealers who keep more than one cow and sell to the neighborhood	251
Number of retailers of milk recorded since last report	75
Whole number of retail dealers in milk recorded to date	3,122
Number of samples of milk inspected since last report	1,975
Number not adulterated	1,463
Number more or less adulterated	512
Number of cases analyzed by chemist	23
Average amount of adulteration in the cases analyzed	25.76
Largest amount of adulteration (water intentionally added in 100 parts) in the cases analyzed	42.18
Least amount of adulteration (added water) in the cases analyzed	10.14
Number of samples analyzed, including above, and not adulterated	00.00
Whole number of samples of milk analyzed to date	305
Number of cases pending in the courts at the date of last report	1
Settled during the year	0
Number of complaints in the Municipal Court	10
Number convicted in the Municipal Court	10
Number of complaints by the Grand Jury	8
Number of bills of indictment by the Grand Jury	8
Number convicted in the Superior Court	8
Whole number of complaints in court to date	240

Whole number convicted to date	172
Whole number not convicted	67
Number of cases now pending in the courts	1
Number of gallons of daily supply of milk for the city of Boston	25,282
Daily cost to consumers	$8,090.24
Number of gallons for supply one year	9,227,930
Cost to consumers one year	$2,952,937.60

The expenses of this office have been as follows, viz. : —

For the analyses of milk	$200 00
Stationery, record books, advertising, printing, etc.	170 39
Inspector's small bills for assistance	
Lactometers, and other milk instruments	23 52
	$393 91
For violations of the milk law there have been paid in the Municipal and Superior courts, fines and costs amounting to	$827 39
One half of the fines have been paid to the complainant, viz. :	$340 00

An act to prevent the sale or exchange of adulterated milk, Chapter 319 and Section 4, provides that violation of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction, and one half of any fine paid shall go to the complainant.

Approved May 4th, 1872.

The duties of the Inspector have been about the same as in former years. Fifteen hundred stores and shops have been visited and the milk examined. Some of these places have required frequent attention. Nearly one hundred private families have requested the services of the Inspector, in regard to their milk. To prevent the distribution of adul-

terated milk in the city, the railroad milk stations have often been visited, and also the stables of milkmen in Charlestown, Cambridge and Somerville, besides those within the limits of this city ; and not a little is received at this office for inspection, from the neighboring cities and towns, the same as from our own citizens.

It has become more generally known than formerly, that no fees or presents, of any name or nature, are now or ever were received for any services rendered by this office, the grand object being to keep in check the adulteration of milk.

In some of the country towns, as well as in this city, during the fall of 1871, and the winter of 1872, frequent meetings were held by different associations interested in the milk trade ; the object of which was to consider the price of milk, its transportation to market, and the existing evil of adulteration.

An account of these meetings was published in the Boston papers, which greatly interested many of our citizens who were not satisfied with the milk furnished their families, and who were ready and willing to avail themselves of any plan, from whatever source, which promised to afford them pure, good milk.

With honest intentions to remedy the evils of adulteration, and afford a pure article at a reasonable price, an association was formed in this city, to commence business on the first of April, 1872, under the name of the *Consumers' Protective Association.*

During the winter of 1872 the annual change or addition to the milk law was made by the Legislature, of which the following is a true copy : —

(CHAPTER 319).

AN ACT to prevent the sale or exchange of adulterated milk.

Be it enacted, etc., as follows: —

SECTION 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine not less than twenty, nor more than one hundred dollars. And for any subsequent offence by a fine not less than fifty, nor more than three hundred dollars.

SECT. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalties provided in the preceding section.

SECT. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty, nor more than three hundred dollars, and for any subsequent offence by a fine not less than one hundred dollars, and imprisonment in the House of Correction not less than thirty, nor more than ninety days.

SECT. 4. Violations of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction, and one-half of any fine paid, shall go to the complainant.

SECT. 5. All acts and parts of acts inconsistent herewith, are hereby repealed, but such repeal shall not effect any prosecutions now pending.

SECT. 6. This act shall take effect upon its passage.

Approved May 4, 1872.

The wise provisions of this and other acts passed by our Legislature since the year 1859, are acknowledged and appreciated by all except those who habitually or occasionally adulterate and skim their milk.

There are constant complaints, coming from persons who buy their milk in the country, that it is not only watered, but, more frequently, deprived of its cream before reaching the cars for transportation.

Those who commit these offences the law seldom if ever reaches; their occasional acknowledgment of the crime and willingness to make a deduction on their milk-bill do not satisfy the good intentions of this law. It is only a compromise with crime, which should never be tolerated under any circumstances whatever.

It has been admitted that there is one honest milkman in Boston, and there may be more whose character and reputation are in constant jeopardy by the quality of the milk taken from the cars as it comes in from the country. We all know that too many of the Boston milkmen adulterate and skim their milk; and thus they have other people's sins to answer for besides their own.

The Inspector visited one of the Boston milk stations, and examined one dairy consisting of four cans, which was delivered to the milk-agent by the farmer. Upon examination, three of the cans were found to contain *40 per cent. of water intentionally added*, and the other can *45 per cent.*; a sample of which was taken for analysis. This dairy of four cans belonged to one of the Boston milkmen, who has always (if his customers can be believed) delivered good milk, with the exception of the last week or ten days, when, by their complaints, he was led to examine this dairy, which was found as above described. Instead of complaining to the milkman, in regard to the quality of the milk, had they brought a sample with a complaint to the Inspector, his duties in the matter would not have been discretionary, but imperative; and

this man, not having adulterated the milk, or having guilty knowledge of its being so adulterated, would have been put through the court, and probably convicted.

It is impossible for a milkman always to know the quality of the milk he leaves his customers, and when he enters upon this business, he not only assumes the risk, but all responsibility.

One of the judges of our courts remarked to a convicted milkman, that it was a *heinous crime* to adulterate, — and there are many others of the same opinion, — whether it is done in the city or in the country.

It is often said that the supply and demand regulate the price of articles of family consumption. This may apply to some of the necessaries of life which cannot be adulterated, but not to milk; for we know that every season, from causes beyond our control, the supply of milk from the country is very limited, which greatly increases the amount of adulteration. And yet hundreds of our citizens will say, "Oh, if my milk contains nothing worse than *water*, I am satisfied. I thought it was manufactured with chalk, starch, etc." This evil of extending the milk keeps the price down, and works mischief continually to both producer and consumer. When all men engaged in the milk business become honest, we shall require more cows, and those who keep them will be better remunerated for their outlay in time, trouble, and expense.

The following information, being useful from year to year, is inserted from my last report: —

"The milk cans used for the conveyance and sale of milk by the dealers are of two classes.

"The large cans, which hold nine quarts and a pint, are in general use by the milk trade of Worcester county, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans, which hold eight quarts and one half pint, are mostly in use on the Fitchburg,

Lowell and Eastern railroads, and no milkman is considered equipped for business unless he is the owner of four or five full sets of cans, either eights or nines, as above described, sufficient to contain the necessary milk for his daily route, one set being in use while the others are on their way to the country for a fresh supply.

"Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers; these are left within the houses, or at some designated place on the premises."

"The contracts for the supply of milk are generally made twice a year, viz., on the first of April, and the first of October."

"The price of milk last summer was about the same as in the year previous, viz.: at the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-two cents. This is sold to stores and shops at from fifty-four to sixty-two cents per can, and is retailed in smaller quantities, to families, at eight cents per quart.

"Although the above prices are such as were generally agreed upon, yet many of the milk dealers, owing to the great competition in the trade, would buy and sell their milk at greatly reduced prices, governed only by supply and demand, the same as with other articles of family consumption."

For the information of those connected with the milk trade of Boston, I would say, that, in the early part of the season a firm in New York sent an agent to this city to introduce to our milk dealers the iron-clad milk-can, which many of those in the trade consider an improvement upon the common tin can, so long in general use. These cans, by their rough usage on the milk-carriage and on board of the cars, soon

become badly indented and defaced so as to require frequent repairs to renew their former shape.

The iron-clad can is made of any size to meet the wants of the milk-dealers, and is sealed by the maker, showing the quantity which it holds.

The can styled No. 2 is the size in general use with our dealers, holding eight and one half quarts, and weighing about five pounds; the common tin can weighing from three and a half to four pounds.

I would here observe that the weather — be it hot or cold, wet or dry — seriously affects the supply of milk, and also the demand for it.

April, 1872. The first part of this month, the weather, with few exceptions, was moderate and pleasant. The supply of milk was about equal to the demand.

The Consumers' Protective Association, by previous arrangements, were prepared on the first of this month to commence business with six or eight new routes. It was not difficult for them to obtain customers from that class of our citizens who had, or thought they had, good and sufficient reasons to complain of their milk; many of these families continued to take a portion of their milk from their old milkman, and at the same time receive a part of their supply from the association. Under these circumstances, whatever may have been the quality of the milk previously, both parties were now deeply interested to furnish good rich milk, so as to retain their customers. The Inspector's services were in demand to decide the quality of each man's milk, and in every family visited, it was found to be good. It is generally not long that two milkmen supply one family with milk, especially if there's a *Bridget* in the kitchen, who can easily arrange matters in her own peculiar way, so that the family will be generally satisfied with the milk, and she retain the man of her choice.

The middle of the month was generally cool and pleasant,

with a supply of milk sufficient for all demands. During this month the Inspector's time was mostly devoted to the examination of the milk at the Boston Highlands, in stores and shops, and some private families at their request.

The general inspection of the milk in this part of the city proved much less adulteration than in the corresponding month of last year.

The weather, the latter part of the month, was variable, and there was but little rain during the month, which, on the whole, was considered backward.

The month closed, however, with a good supply of milk.

May, 1872, came in with dull, lowery weather, and a number of fine rain storms, which greatly assisted in bringing forward the season, by many considered at least two weeks late. Milk was plenty, and the great competition in the trade had a tendency to improve the quality, thus working to the advantage of the consumer.

The middle of the month was cool and very dry; and generally, the milk in stores and shops was found better than usual. The latter part of the month was attended with considerable dull weather, some rain, and an occasional pleasant day, but not with the usual amount of rain expected at this season of the year. The month closed, however, favorable to the dealers in milk.

The establishment of milk depots in the different wards of the city, for the sale of milk, to be carried away, and also sold over the counter by the glass, was quite a new feature in the milk trade of Boston. This milk was obtained from the Consumers' Protective Association, so called, but though under their name, it was not carried on by persons in their employ; rather by men on their own account, who were pecuniarily interested to obtain of them, and to sell, a good article of milk. It was said that, during the hot season, some of these milk depots sold from one to two hundred gallons of milk per day.

One of the court officers remarked that "he had no doubt these *bar-rooms* for the sale of milk had reduced the sale of beer and other articles, which by many are considered injurious to the health and happiness of our people." Of my own knowledge I can only say that I examined the milk in these depots, the same as in other places, and it was found to be good. There were some persons, however, patrons of these places for a time, to obtain their family supply, who declared that the milk was not so good as that sold at some of the neighboring groceries.

June, 1872, commenced with cool weather, frequent rains, a good supply of milk, and a moderate demand for it. On the 4th and 5th, a cold, north-east storm prevailed, which afforded a bountiful supply of rain.

The middle of the month was warm, with an increasing demand for milk, and some of the dealers were hard-pressed, and found it difficult to obtain a sufficient supply for their customers, although seasonable preparation had been made to meet the wants of our largely increased population, in consequence of the Jubilee, which opened on the 17th of this month.

The latter part was attended with cool, dull weather, and frequent rains, which proved much more favorable to the milkmen, as sufficient milk came in from the country to satisfy all demands.

The last two or three days of the month, however, were very hot, with a daily falling off of our supply from the country, and an increasing demand in the city.

July, 1872. The weather, until the 17th day of the month, was very hot, with frequent copious showers, accompanied by lightning and heavy thunder, which proved equally destructive to large and small quantities of milk. These showers generally cool the air, but this season the laws of nature appeared to be reversed, so that afterwards the heat was more oppressive than before.

The demand for milk was great, and the supply very limited.

Soon after the 4th of the month, however, the Jubilee visitors gradually disappeared, and, as is usual at this season, many families left the city for more genial resorts in the country, which greatly reduced the demand for milk.

The amount of adulteration, however, was greater than any experienced during the three previous months.

From the 18th to the close of the month, the weather was fine and comfortable, with the exception of a few days, which were dull, lowery, and at intervals rainy, and the month closed with better prospects in the future for more milk, and that of better quality.

AUGUST, 1872. The first few days of the month were cool and pleasant; the 7th and 8th, however, were very hot, yet the supply of milk nearly or quite equalled the demand. The hot weather continued with frequent rains and unusually heavy thunder ; thus rendering our supply of milk for the time unfit for use, and again increasing the demand, consequently the amount of adulteration.

This state of the milk trade continued until past the middle of the month, in consequence of the continued hot, sultry weather. The last few days of the month were cool, with heavy rains, which again increased the supply of milk, so that in visiting stores and shops at the south part of the city, with few exceptions, it was found quite free from adulteration.

SEPTEMBER, 1872, was cool and pleasant until Sunday the 8th, which was very hot, and by many considered the most melting day of the season. The supply of milk at this time with the dealers was sufficient to satisfy the wants of the consumers.

The middle of the month was cool, and on the 14th day a rain-storm commenced from the north-east, which continued more or less severe until the close of the 20th. The general inspection of the milk was at East Boston, and it averaged

about the same as in other parts of the city; many of the cow-stables and cow-sheds were visited, their condition showing more conclusively than ever that East Boston is not a suitable place for the production of milk.

We have had reason to suppose that the severe penalties inflicted in other countries, on the persons who adulterate their milk, would have a tendency to check, if not entirely to stop the evil, but it appears otherwise, if we can credit a recent official report which says, "The provisions furnished to the work-houses of London show that, of fifty-seven samples of milk so supplied, only two came under the designation of best unskimmed milk. Eight samples were neither skimmed nor watered, but were poor as yielded by the cow.

"The remaining supplies were either skimmed or watered or both. Ten samples were totally skimmed and largely watered, and seven samples consisted of fifty per cent. of milk, and fifty per cent. added water.

"Although no poisonous or deleterious matter was found in the samples, yet the dilution with water, it is stated, made the milk utterly unreliable as good for infants or aged persons.

"The prices paid for the milk supplied at the work-houses in London varied from fifteen to twenty-four cents per imperial gallon. Genuine milk was supplied at from seventeen to eighteen cents per gallon, and twenty cents was charged for milk totally skimmed, and very largely watered, and twenty-four cents where the cream had been skimmed off and a little water added."

October, 1872, came in with cool, variable weather and heavy rains. The pastures continued to supply nourishment for cattle nearly equal to any month during the season, affording a good supply of milk.

On the first of this month the winter contracts and the advance price of milk usually commence; but at this season the supply appeared fully equal to the demand, so that many

of the milkmen continued the summer prices, while others sold their milk at a small advance during the winter season.

This month, on the part of the Inspector, was mostly devoted to examining the milk in stores and shops at South Boston, and the milk was found to be as good as in any of the wards, if we except the sixteenth, Dorchester.

The milk has always been found good at Washington Village, and this year does not admit of any exceptions over former years. While attending to other duties in South Boston, the cow-stables and cow-sheds were visited; and but little can be said favorable to the keeping of cows in this part the city; without pasturage, roaming about the streets, trying to find a patch of green grass, drinking from puddles of stagnant water, and finally returning to the cow-sheds to satisfy their hunger with a half bushel of sour brewers' grains. Can milk thus produced be considered as good, wholesome milk? Yet hundreds of families in the neighborhood are anxious to obtain it for their infants, because, as they say, "We can depend upon its being fresh, and not adulterated." It is hard for people to realize the difference between the milk from cows fed on brewers' grains, and those which are kept in the country and nourished in summer by sweet green pastures, and in the winter by roots of various kinds, with the addition of good English hay. The amount of cream on the former will not often exceed 8 or 9 per cent., whereas the amount on the latter will generally reach from 12 to 15 per cent., and oftentimes more.

The middle of the month the weather was variable, with a few cool, pleasant days, and some rain. The milk trade continued about the same as at the beginning of the month. From the 20th to the close, however, the business was seriously interrupted by the horse malady, which spread to such an extent that nearly all of the horses in the city were suffering in one form or another by the epidemic. Some of the milkmen could supply their customers with milk only every other day,

while others were compelled to abandon theirs altogether, and two or three of the wholesale dealers resorted to the use of oxen in supplying their customers.

The weather the last few days of the month was cold and blustering, and it finally closed with a severe north-east rain, storm.

November, 1872. The first part of the month gave us heavy rains, and a number of days of moderate pleasant weather, with an ample supply of milk.

The grass fields and pasture lands were never in better condition than now for the setting in of winter. The sod was almost as green as in June; the extreme moisture of summer and autumn had preserved the luxuriance and sustained the freshness of mowing and grazing fields to an unusual degree.

The middle of the month, with few exceptions, was cool and pleasant.

The supply of milk from some sections of the country was very limited. It was said that, in consequence of the horse malady, the collectors were unable to carry their milk to the cars for transportation.

The latter part of the month was generally quite mild and pleasant, and again affording a generous supply of milk, and the facilities for obtaining it much improved.

The annual Thanksgiving increased the demand for milk, which created a brisk trade for all dealers, and there were but few complaints from the consumers as to the quality.

December, 1872. The pleasant moderate weather of last month continued to about the tenth of this. The supply of milk, so fluctuating again, appeared a source of trouble, especially to some of the small dealers; and the larger ones had none to spare, excepting at a greatly advanced price.

From the tenth to the middle of the month there was very cold weather, without much if any improvement in the quantity of milk; the last ten days of this month, with the

exception of two or three, were marked by very severe cold winter weather, with an unusual amount of snow. On Thursday, the 26th, the snow-storm was very violent, and in quantity sufficient to blockade the milk-cars on the railroads, thus reducing our already short allowance to none at all from this source. This state of the milk trade was a great annoyance to that class of dealers dependent on the regular running of the trains for their daily supply.

The milkmen from the neighboring towns, although not flush of milk, were generally enabled to meet the pressing demands of their customers.

January, 1873. For the first ten days of this month the weather was very variable; some days very cold, and others moderate, with dull, lowery weather, and rain. There were but few complaints during the month in regard to the quality of the milk, which was generally plenty with all the dealers.

The middle of the month was generally moderate, with rain, and a few cold, blustering days. A number of days in the latter part of the month were very cold, with snow sufficient for good sleighing, and a few days that were moderate and pleasant.

February, 1873. The weather of the first few days was moderate and pleasant, and with few exceptions continued so to the middle of the month. At this time the supply of milk with the large dealers fully equalled the demand.

The latter part of the month afforded an abundance of snow, which obstructed the milk trains greatly, to the disappointment of the milkmen, and also of their customers. Monday, the 24th, was very cold; the month closed, however, with moderate dull weather.

March, 1873, commenced with heavy snow-storms and cold weather. The supply of milk, at this time, was very limited, in consequence of the deep drifted snow in towns from which we receive a portion of our supply. In many

of these places the roads were impassable, so that the collectors were unable to obtain their milk for transportation.

On the tenth day of the month occurred another snow-storm, from the north-east, which in violence almost equalled any during the winter.

The middle of the month afforded a number of warm, pleasant days, and some rains causing the snow to settle and to disappear rapidly.

The latter part was variable, with a number of days quite cold and blustering. The month closed with a good supply of milk. The winter as a whole was unusually hard for the milkmen, and, in fact, for all connected with the milk trade of Boston.

MILKMEN'S ASSOCIATION.

At the time of the establishment of this office, August, 1859, there were about two hundred milkmen who distributed their milk from carriages, in various parts of this city. About sixty of this number associated together under a code of by-laws; and they held their meetings a few days previous to the first of April and the first of October. The object of these meetings was to determine the price to be paid per can for milk at the milk stations, and also to decide upon a uniform price to be paid by the stores and shops, as well as the retail price at which milk should be supplied to families.

It was considered then necessary that none of them should sell milk at a reduced price, or use any unfair means to obtain the custom of others of their number. Any misdemeanor, or violation of their rules, whereby any of them suffered loss, was referred to a committee; and if adjudged guilty the defending party was to make proper restitution.

At the time this association was in existence, it was thought by many of our citizens that one of its main objects was mutually to assist in defending their cases for violation of the milk law; but such was not the fact.

There were in the association a number of good men, who were desirous for their own interest that the milk law should be enforced; for they realized the fact that it was hard for them to compete with those who were in the daily practice of adulterating their milk, thereby enabling them to undersell those who did not.

The meetings of this association have been discontinued a number of years.

MILK AGENTS' OR CONTRACTORS' ASSOCIATION.

These men — but few in number — with the milkmen whom they supply, form the connecting link between a part of the milk-producers, and many of the consumers of milk in the City of Boston. For the transportation of their milk they are connected with the Fitchburg, Lowell, Hartford and Erie, and Eastern railroads. As was stated in a former report, "The general plan for conducting the milk business on these roads is different from that adopted on some of the others, viz.: milk agents contract twice a year with the farmers for their milk, thus relieving them from the further care, except in receiving the price agreed upon, once a month. Milk collectors are employed by the agents to collect the milk from the farmer's door, and deliver the same to the agent, at the door of the milk-car. The agent remains on the train in care of the milk, until its arrival at the depot in the city; and having received the milk account of his collector (and the dairy marks on the cans), he knows every can of milk in the cars, and from whom it came.

"The milkmen with their carriages are generally at the depot, ready to receive their milk on the arrival of the cars, each one receiving from the agent sufficient (if he can) to meet the wants of his customers; for which milk the agent receives his pay once a month."

It is for the interest of both the contractor and the milkman that contracts should be made twice a year in regard to

the quantity of milk required by the milkman, as well as the market price per can; and it is also considered important to the agent that the milkman should not stop taking his milk without sufficient cause, and giving due notice of his intention to leave the car. It is expected that this contract will be observed, otherwise the milkmen would be liable to leave the car at any time, greatly to the injury of the agent, and resort to some of the other roads for his daily supply; which, under the existing arrangements, he cannot do.

As to this association, my duties often bring me in contact with it; and, thus far, I have failed to find any reason why it was not for the interest of its members to obtain good, pure milk from the farmers, and deliver the same at the depot to the milkmen.

Milk-Producers' Association of Massachusetts and New Hampshire.

This association was organized a few years since to advance the great interest of all farm products, and milk in particular, the dairy holding a prominent place in nearly all the agricultural districts of New England.

The assembling together of persons engaged in the same business, some of large experience, imparting information to others less favored, has a tendency to raise the standard of all by concert of action; giving them power as an association to accomplish acts and bring about results which could not be done by individual effort. The price of milk at the farmer's door, and the matter of obtaining cheaper conveyance to a market, have for a long time engaged the attention, not only of this association, but of all producers of milk living at a distance. We often hear it said by consumers, "Oh, I would willingly pay ten cents a quart, if I was always sure of getting pure, good milk;" but there is but little prospect of so desirable a result being reached while the cow and the consumer remain so far apart, — the distance making it neces-

sary for the milk to pass through so many hands before reaching the consumer.

We find that our New England Association is not alone upon this subject, for the milk producers of old England are following in our wake in this matter — as well as in some others.

On the 23d day of March, 1872, a large meeting of the milk-producers was held at Manchester, England, and the following subjects were freely discussed, viz. : —

The cost of cows now, compared with their former value, the difference in the cost of their keeping, the advance pay to farm laborers, the actual cost of raising milk, the expenses of transportation, the price paid by the consumer, and the evil of adulteration. Before the meeting closed, it was voted that a committee be appointed to confer with the City Government of Manchester, for their assistance in the appointment of Inspectors of Milk, and a chemist, whose united efforts should be for the suppression of the adulteration of milk, — a crime which had become of vital importance, and of sufficient magnitude to affect the interest of the producer and the health of the consumer.

The "Milk Journal and Farm Gazette," a monthly document published in London, is deserving of notice, as affording valuable information to the dairy and farming interest of their own people as well as others. Some new ideas, inventions, and experiments may be obtained from reports and papers sent from this country and copied by them, and it is possible that we, in return, may learn something new by their experience that may prove to the advantage of some of our people engaged in the same business, which this paper is so earnestly endeavoring to promote.

WESTBORO' MILK-PRODUCERS' ASSOCIATION.

This Association of Farmers of Westboro' and vicinity was formed during the winter of 1868, for the purpose of deliv-

ering their own milk in the Boston Market for sale. To this end, April 1st, 1868, a new milk-car was placed on the Boston and Albany Railroad, which now brings in about five hundred cans of milk daily, which, for quality, will compare favorably with any received in the city.

There are no agents, or middle-men, connected with this car and its arrangements, excepting those in the employ of the association; their agent resides in the city, and is generally present on the arrival of the milk, to deliver the same to his customers, the milkmen, from whom, once a month, he receives his pay.

This plan of conducting the milk business between producer and consumer appears as favorable as any, if we except a large number of the milkmen who receive their milk from Westborough by this road, and contract for it directly with the farmer; thus bringing two of the three most interested parties in direct communication, not only in regard to the pay, but, also, as to the preservation and the quality of the milk. Considering that this milk is not raised in our immediate neighborhood, but is transported from quite a distance, the latter arrangement is as perfect as any that can be devised between the milk-producer and the consumer.

We receive daily, by the Boston and Albany Railroad, about three thousand cans of milk.

MILK CONSUMERS' PROTECTIVE ASSOCIATION.

This association was formed during the winter of 1872, by gentlemen and ladies favorably known to the citizens of Boston. A number of meetings were held during the winter, the object of which was to make arrangements for supplying the citizens of Boston with pure milk at a reasonable price. With so desirable an object in view, quite a large number of families were ready and willing to patronize the association. All the necessary arrangements being

completed, they were prepared to commence business on the first of April, 1872, with a number of routes, and a contract for their milk with country dealers to the amount of from three to five hundred cans.

None doubted the honest intentions of the association; but many could not clearly see, under the circumstances, how they could fully realize their expectations; commencing, as they were, a hard, perplexing, intricate business, with which they themselves were entirely unacquainted, and their work in detail to be carried out by a class of persons who could not have any special interest in the success of their employers.

Notwithstanding the many discouraging difficulties they had to encounter, the Inspector can only say that his services were but seldom required, and but few samples of their milk were brought to his office for inspection; and, furthermore, the milk furnished by them in stores and shops, with few exceptions, was found to be good. It was said, however, that during the season, many families ceased taking their milk, and that frequent complaints were made at the office of the association in regard to its quality.

It is possible that some of their drivers could account for those frequent complaints and loss of customers, much more readily than any one else.

There are now a number of the association routes said to be in successful operation; the management of which, however, has materially changed since they commenced business, and under the new order of things, the interest of those who deliver the milk will be advanced, and those who use it will be better satisfied.

The present arrangement appears to be, that each separate route is run by a different member of the association, who is responsible for his milk, and receives for himself all the advantage and gain to be derived from his hard labor

and constant attention to his business, instead of contributing to that of others.

We sometimes find men engaged in the milk business whose honest intentions are sadly frustrated by unprincipled, avaricious men in their employ; and there certainly is no article of family consumption which affords greater facilities for adulteration than milk, and none in which these facilities are so often taken advantage of.

It is but a few years since a gentleman of Boston, desirous of enriching his farm, which was situated but a few miles from the city, stocked his place with nearly one hundred fine cows; and at the same time conceived the idea of supplying his friends in the city with pure, rich milk. His name was sufficient to insure all the desired custom.

Old milkmen, who had supplied some of these families for years, were discharged, and with new hope and better prospects for the future, they commenced receiving their milk from this new source.

Their expectations were more than realized; and great praise of the superior quality of the milk was heralded from house to house. This state of things continued for a season, when, finally, one after another became dissatisfied with their milk.

Where could the trouble be? Surely, not in the cows, — nor in their owner, for he had resorted to every conceivable means to insure his customers good pure milk; and, to use his own expression, "I know that my milk was as rich and as pure as any cow in the country could produce when it left my premises; but how long it remained so is very uncertain." This gentleman's experience in the milk trade was sufficient to induce him to withdraw from it immediately.

The following incident may illustrate the danger of promising families pure milk, even when one *does his own milking, and delivers the milk himself.*

During the month of 1868, a sample of milk was brought to the Inspector's office for examination, by two men, the one as principal and the other as a witness in the case, to prove that the milk was then in the same condition as when left in the family of the complainant.

The latter stated that "he resided within the limits of Boston, and was induced to obtain his family supply of milk from one of his neighbors, owing to the fact that he kept a number of fine cows, and would insure his milk to be pure, as he always did his own milking and delivered the milk to his customers himself." The milk was examined, and found to be badly extended, as the analysis by the chemist afterwards fully proved.

A few days later in the month a note was received from a family in the same neighborhood, requesting the services of the Inspector, who was on hand at an early hour the following morning, and was present when the milk was left by the same man as in the former case. A sample of the milk was taken for analysis, and it was proved that water had been intentionally added to the amount of 40.70 in one hundred parts, and in the former case 47.68 in one hundred parts. This man went through the court of the County of Suffolk and in both cases paid his fine and costs very quietly. It was well known, however, by some of those interested, that the milking and the delivery of the milk to customers, so far as the man was concerned, was honestly done; but the straining and putting up of the milk *was performed by his better half while he was in an adjoining room at breakfast.*

Analyses of Milk during the year 1872-73.

Analysis No. and Mark.	Specific Gravity.	Amount of Cream.	Solids.	Water.	Added water in sample.
283	. . .	9 per cent.	10.60	89.40	20.50
284	. . .	6 "	9.17	90.83	32.00
285	. . .	. . .	10.35	89.65	23.33
286	1.020.5	. . .	10.60	89.49	21.48
287	1.028	5 "	10.20	89.80	24.40
288	1.026	4 "	9.70	90.30	28.14
289	1.027	4–5	10.12	89.88	25.10
290	1.026	4 "	10.50	89.50	25.00
291	1.027	4. 5 "	10.60	89.40	24.28
292	1.030	4 "	10.90	89.10	25.58
293	. . .	4 "	10.20	89.80	24.44
294	. . .	. . .	10.92	89.08	22.14
295	1.024	5 "	9.45	90.55	32.05
296	1.022	3 "	8.75	91.25	37.05
297	1.025	4 "	9.55	90.45	31.79
298	1.026	5 "	11.01	88.09	23.04
299	1.027	2 "	11.01	88.09	20.72
300	1.021	. . .	9.75	90.25	27.78
301	1.030	8 "	13.43	86.57	10.14
302	1.028	3 "	11.25	88.75	20.38
303	1.027	4 "	10.48	89.52	25.55
304	1.027	5.25	10.64	89.36	25.52
305	1.017	6 "	8.26	91.74	42.18

Chemical analyses of Milk during the first year of this office 1859 *&* 1860.

		Added water in 100 parts.
September	19, 1859	36.70
"	22, "	46.98
"	21, "	22.10
"	26, "	32.04
"	30, "	34.70
October	14, "	22.06
"	17, "	39.31
"	22, "	22.10
November	10, "	19.97
"	10, "	40.70
"	19, "	23.36
"	25, "	22.10
"	25, "	58.14
"	25, "	34.89
December	2, "	44.19
"	3, "	34.89
"	20, "	30.24
"	29, "	31.36
"	29, "	36.05
January	10, 1860	34.89
"	27, "	24.66
March	3, "	40 00
"	31, "	31.40
April	6, "	48.84
"	26, "	36.63
June	16, "	33.73
July	13, "	44.77
August	23, "	29.07
"	23, "	33.73
Average		34.12

Chemical analyses of Milk during the last year, 1871 *and* 1872.

		Added water in 100 parts.
October	16, 1871	28.96
April	17, 1872	20.50
May	2, "	32.00
"	30, "	23.33
"	30, "	21.48
June	10, "	24.40
"	22, "	25.00
"	22, "	24.28
"	22, "	25.58
"	24, "	28.14
"	24, "	25.10
"	24, "	24.44
"	25, "	22.14
July	5, "	32.05
"	5, "	37.05
"	17, "	31.79
"	17, "	23.04
"	17, "	20.72
"	22, "	27.78
August	13, "	10.14
"	15, "	20.38
"	15, "	25.55
Average		25.17

In conclusion, the usual acknowledgments are due to the courts, officers, and members of the police department, as well as many private citizens, who have interested themselves in the furtherance of the objects of this department.

Respectfully submitted,

HENRY FAXON, *Inspector.*

CITY HALL, BOSTON, March 31, 1873.

City Document. — *No.* 36.

CITY OF BOSTON.

FIFTEENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1874.

CITY OF BOSTON.

To His Honor the Mayor, and Aldermen of the City of Boston: —

Gentlemen, — In accordance with the custom of the last fifteen years, I with pleasure submit the following report of my office, commencing April 1, 1873.

The laws of this Commonwealth require that all Inspectors of Milk shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits.

This law has been fully complied with in this department. In consequence of the magnitude and extent of the milk business in this city, and for convenience and system, the milk trade is divided into two branches, of which separate sets of books are kept at the office of the Inspector.

1. Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those who keep more than one cow, in the city proper, in the Sixteenth Ward (Dorchester), Boston Highlands, and South and East Boston.

2. Retail dealers are those who sell in small quantities from market places, stores, shops and cellars.

The milk dealers in the recently annexed territory of Charlestown, Brighton and West Roxbury have not been registered, and are not included in this report.

Number of cows kept within the limits of the city of Boston	1,310
Viz.: number in the city proper	28
Number in the Sixteenth Ward, Dorchester	604

Number at the Boston Highlands	420
Number at South Boston	100
Number at East Boston	158
Number of persons who keep but one cow	300
There have been recorded the names and places of business of wholesale dealers in milk, since last report	48
Whole number of wholesale dealers registered	1,375
Whole number of wholesale dealers now in the business	520
Whole number of wholesale dealers now selling from carriages	266
Whole number of small wholesale dealers who keep more than one cow and sell to the neighborhood	254
Number of retailers of milk recorded since last report	32
Whole number of retail dealers in milk recorded to date	3,154
Number of samples of milk inspected since last report	1,863
Number not adulterated	1,317
Number more or less adulterated	465
Number of cases analyzed by chemist	37
Average amount of adulteration in the cases analyzed	29.43
Largest amount of adulteration (water intentionally added in 100 parts) in the cases analyzed	49.62
Least amount of adulteration (added water) in the cases analyzed	7.00
Number of samples analyzed, including above, and not adulterated	1
Whole number of samples of milk analyzed to date	342

Number of cases pending in the courts at the date of last report	1
Settled during the year favorably to the government	1
Number of complaints in the Municipal Court	11
Number convicted in the Municipal Court	11
Number of complaints to the Grand Jury	13
Number of bills of indictment by the Grand Jury	13
Number convicted in the Superior Court	11
Whole number of complaints in court to date	264
Whole number convicted to date	195
Whole number not convicted	67
Number of cases now pending in the courts	2
Number of gallons of daily supply of milk for the city of Boston	26,329
Daily cost to consumers	$8,425 28
Number of gallons for supply one year	9,610,085
Cost to consumers one year	$3,075,227 20

The expenses of this office have been as follows, viz.: —

For the analyses of milk	$310 00
Stationery, record books, advertising, printing, etc.	225 14
Inspector's small bills for assistance, lactometers, and other milk instruments	24 18
	$559 32
For violations of the milk law there have been paid in the Municipal and Superior Courts, fines and costs amounting to	$1,565 90
One half of the fines have been paid to the complainant, viz.: —	$665 00

During the winter of 1872 a change or addition to the milk law was made by the Legislature, of which the following is a true copy: —

Chapter 319.

An Act to prevent the sale or exchange of adulterated milk.

Be it enacted, etc., as follows: —

Section 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than twenty, nor more than one hundred dollars; and for any subsequent offence, by a fine not less than fifty, nor more than three hundred dollars.

Sect. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalties provided in the preceding section.

Sect. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty, nor more than three hundred dollars; and for any subsequent offence by a fine of not less than one hundred dollars, and imprisonment in the House of Correction not less than thirty, nor more than ninety days.

Sect. 4. Violations of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction, and one half of any fine paid shall go to the complainant.

Sect. 5. All acts and parts of acts inconsistent herewith are hereby repealed, but such repeal shall not affect any prosecutions now pending.

Sect. 6. This act shall take effect upon its passage.

[Approved May 4, 1872.]

To carry out the good intentions of this law your Inspector has devoted his time during the year. Stores and shops within the limits of the city where milk is sold have been visited and the milk examined. Some of these places have required frequent attention.

More than one hundred families have been visited that desired the assistance of the Inspector in regard to their milk; and not a little has been brought to this office for inspection from the neighboring cities and towns. To prevent the distribution of adulterated milk in the city, the railroad milk stations have often been visited, and also the stables of milkmen, not only in the city, but also in the neighboring towns. Nearly every day milk may be found at some of the milk stations, which was either watered or skimmed previous to its leaving the dairy. Those who commit these offences the law seldom if ever reaches; and the returning of the milk whence it came does not have the desired effect, except for a short time; and, besides, the men who usually take these dairies are dependent on them for their daily supply of milk for their customers.

During the latter part of January, 1874, the milk-car on one of the railroads was visited, and the milk of two or three dairies was found more or less adulterated, and one dairy, consisting of only one can of milk, on analysis proved to contain 33.67 of added water in one hundred parts. The following information, being useful from year to year, is inserted from my last report: —

"The contracts for the supply of milk are generally made twice a year, viz.: on the first of April and the first of October.

"The milk-cans used for the conveyance and sale of milk, by the dealers are of two classes. The large cans, which hold nine quarts and a pint, are in general use by the milk trade of Worcester county, and by many of those who collect their milk in the towns in the

vicinity of Boston. The smaller cans, which hold eight quarts and one half pint, are mostly in use on the Fitchburg, Lowell and Eastern railroads, and no milkman is considered equipped for business unless he is the owner of four or five full sets of cans, either eights or nines, as above described, sufficient to contain the necessary milk for his daily route; one set being in use while the others are on their way to the country for a fresh supply.

"Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers; these are left within the houses, or at some designated place on the premises."

"The subject of requiring that cans used in the sale and conveyance of milk be of uniform size, and sealed as a measure, has nearly every season, for the past ten or twelve years, engaged the attention of our Legislature; and there seems to be no sufficient reason why milk-cans should be exempt from the restrictions placed upon other measures in daily use. It has often been contended that milk-cans are not used as measures, but are only of a convenient size for the transportation of the milk, which is bought and sold by the can, without regard to the quantity which the cans hold. These cans, of different sizes, may be found in stores, shops and every place where the milk trade is carried on; and most persons who sell or buy milk from these cans, year after year, are disposed to believe that it makes to them quite a difference whether the cans hold nine quarts and a pint, or only eight quarts and one half pint."

"In the retail trade of milk, many of our families prefer to receive their daily supply in small cans, of a size to meet the wants of the family. To this arrangement none can object, provided the cans are sealed, showing the quantity which they hold."

During the winter of 1873, an act was passed by the Legislature, of which the following is a true copy : —

Chapter 180.

An Act concerning the purchasing of milk and the size of milk-cans.

Be it enacted, etc., as follows: —

Section 1. All milk-cans used by persons engaged in the business of purchasing milk at wholesale shall be sealed annually by the sealer of weights and measures in the city or town where the purchaser resides, and no milk-can shall be sealed which does not contain one or more quarts, without the fractional parts of a quart, and the capacity of the can shall be legibly marked upon it by such sealer.

Sect. 2. When milk is purchased by the can, such can shall hold eight quarts of milk, and no more.

Sect. 3. Every person violating the provisions of this act shall be punished by a fine of not less than twenty dollars nor more than fifty dollars, one half of which fine shall inure to the use of the complainant.

Sect. 4. This act shall take effect on the first day of July next.

[Approved April 14, 1873.]

By this law the general order of things seems to have been reversed, by punishing the *buyer* of short measure, instead of the *seller*. Whatever the effect of this law may have been, I have not heard that any complaints were made to the courts during the year, or that any effort was made for carrying out the intentions of the law.

The milk trade of Boston has become extensive enough to require the daily use of fifty thousand or more milk-cans, besides the small cans in daily use for the family trade. It would be no easy task for the owners of these cans to collect

them for the purpose and intent required by the law, and it is difficult to understand how they can be spared from their constant use in carrying on the milk trade.

Again, thousands of these cans have been long in use and are so dilapidated that they are not worth the expense of changing to a uniform size.

Most of the men engaged in the milk trade supply themselves annually with a new addition to their stock of cans, according to the size of their routes. These new cans are marked with their owner's name or his initials, and are immediately brought into active service with thousands of others, and forwarded on their mission to the country for a supply of milk, and soon become scattered, and so mixed up with the cans at the other milk stations that it would be impossible for the owner to find one half of them. It may be observed that this law requires that all milk-cans used in the wholesale trade shall be *annually* sealed by the sealer of weights and measures. This is certainly a good idea, but one that would be found extremely difficult to put in practice.

In the month of September, 1862, to carry out the then existing law in regard to the selling of milk at wholesale in unsealed cans, a number of complaints were made to the courts, and were continued from time to time for consultation with the associate justices of the court; who at length decided that no complaint could be sustained upon that section of the statute providing for the punishment of selling milk in unsealed cans, or other vessels; because, they say, the cans in which the milk was sold must be shown to be measures. Under the above ruling of the court the defendants were all discharged. These I think were the first complaints ever made in this city against parties for selling milk in unsealed cans, and, as far as I know, the last. When we consider, however, the vast amount of capital invested, and the thousands of persons directly and indirectly employed, in the milk trade of Boston, it is but reasonable to demand and to

have good practical laws and restrictions for the government of the business, and the persons engaged in it.

Many of our large families, boarding-houses, stores, shops, and eating-houses take one or more of the large cans of milk every morning for their daily consumption, as it comes direct from the country; and to many persons it has appeared difficult to determine where the line should be drawn between the wholesale and the retail sale of milk; and still more difficult to see any good reason for the law restricting the sale of milk to what is termed wholesale, and not at retail. Many families receive their daily supply of milk in what is called a six-quart can; the can is not sealed, and how are they to know whether or not they receive the quantity for which payment is demanded?

The daily supply of others is four quarts of milk, and it is left for them in what is supposed to be a four-quart can, which, of course, is not sealed; and no one knows whether the can holds the professed quantity or not. The same difficulty exists with those families who expect to receive in their smaller cans *two quarts* of milk, and, also, with hundreds of our small families who receive their milk in the *one-quart* cans. In order to remedy and settle this long-vexed question in regard to the capacity and the sealing of milk-cans used in the conveyance and sale of milk, which seriously interests not only the producer and consumer, but all others engaged in the milk trade, it is believed, by many long engaged in this business, that a practical law could be enacted by our Legislature, which would be effective and not oppressive, and which would afford relief and satisfaction to all concerned. To this end milk should be bought and sold, at wholesale and retail, from cans or vessels of the following dimensions, viz.: ten quarts, eight quarts, six quarts, four quarts, two quarts, and one quart. These cans should be sealed by the maker, or by the sealer of weights and measures, with figures which should plainly show the quantity which they hold; and

when thus sealed they should constitute and be accepted as legal measures, wherever milk is bought and sold.

Again, whoever should make, keep for sale, or sell, cans or other vessels to be used in the transportation or sale of milk, holding more or less than the figures upon them indicate, should be punished by a fine of not less than twenty nor more than fifty dollars for each offence. In this way, it will readily be seen, the new cans would gradually work into use throughout the State, and the old cans disappear, much to the relief and advantage of all persons, dealers and consumers alike.

The price of milk has varied but little in the last two or three years; the increasing facilities of railroads and their branches, as they extend more and more into farming districts, are daily furnishing us milk from places heretofore not drawn upon, so that the price of milk does not advance in proportion to the increase of our population.

The price of milk last summer was about the same as in the year previous, viz.: At the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-eight cents. This is sold to stores and shops at from fifty-four to sixty-two cents per can, and is retailed in smaller quantities to families, at eight cents per quart. Although the above prices are such as were generally agreed upon, yet many of the milk-dealers, owing to the great competition in the trade, would buy and sell their milk at greatly reduced prices, governed only by supply and demand. During the last summer a number of stores and shops were found which were supplied with good pure milk at forty cents per can, and families at six and seven cents per quart.

April, 1873. The first part of this month the weather was variable, with a few very pleasant days, and many which were cold, dull and lowery, with but little rain. The supply of milk was generally sufficient for all demands.

I would here observe that the weather, as it is cold or hot, wet or dry, seriously affects the supply of milk, as well as the demand; and often the quality is materially affected by the sudden changes in the weather.

The 12th and 13th of this month brought on a cold north-east snow-storm, accompanied with high wind. The latter part was cool, with but little rain, and the month closed with an ample supply of milk.

The general inspection of the milk this month was in the stores and shops at the Boston Highlands.

On the 26th day of this month the Highlands were visited at an early hour in the morning, and the Inspector happened to be present as a milkman was leaving his can of milk with one of his poor customers. After the milk was well mixed, by turning it from one can to another, a sample was taken for analysis, which showed that 49.62 per cent. of water had been intentionally added in one hundred parts.

As this man had previously been before the court, the judge, who considered the adulteration of milk a heinous offence, imposed upon him a fine and cost amounting to two hundred and ten dollars.

May, 1873. The 2d and 3d days of this month gave us a cold north-west rain-storm, with high wind; and again on the 5th the storm was very cold, with considerable rain and sufficient snow to cover well the ground; in fact the weather on the first fifteen days of the month, with two or three exceptions, was stormy, or dull and unpleasant.

There appeared but little complaint in regard to the quantity of the milk, and the quality would compare favorably with the corresponding month of the previous season.

The latter part of the month, with the exception of a few days, was quite cool and dry; the general inspection of the milk was at the north and west parts of the city.

The establishment of milk depots in the different wards of the city, which commenced the season previous, for the sale

of milk to be carried away, and also over the counter, by the glass, still continues, and their trade rather increases, forming as it does quite a favorable feature for the milk trade of Boston.

June, 1873, was remarkably dry throughout, and very cool until the nineteenth day, when the weather became warm and some days very hot.

A number of the milk depots were visited in regard to the quality of the milk, which, with the exception of a few dairies, was found good; and the supply at this time continued favorable for the dealers.

The general inspection of the milk in stores and shops this month was at the west part of the city, and then to the neighborhood of the South Cove. In this locality many of the people have but little regard to the quality of their milk, their only effort being to obtain the largest possible quantity for the least amount of money; and here, as in some other places, they are constantly on the watch to give information that will protect their milkman from prosecution, rather than assist the officer in the discharge of his duties.

The month closed with hot, sultry weather, and a gradual decrease in the supply of milk from the country.

July, 1873, commenced with dry, hot weather, and an increasing demand for milk, and our supply decreasing, as mentioned at the close of last month. However, at this season many families leave the city for more genial resorts in the country, which affords considerable relief to the milkman, as it enables him to meet more liberally the wants of those who remain.

At the middle of the month the milk supply had not increased, as the weather continued hot and dry, with the exception of two or three days, which were cool and comfortable; many of the milk-dealers were hard pressed to obtain sufficient milk at any price to meet the wants of their customers.

We have a few men engaged in this business who are seldom if ever found short of milk, always watching the times and changes of the season, making wise provision before hand for the days of famine, so that when the scarcity comes they not only have enough for themselves, but are prepared to supply their brother milkmen at a greatly advanced price.

It may not be out of place here to mention the fact, that many of our unprincipled milkmen, both in the spring and in the fall, contract for much less milk than will honestly supply their customers at any time; so that when the extra demand comes for milk, occasioned by the dry, hot weather, they are very unwilling to buy of others and pay the exorbitant prices. Consequently they *extend* their milk by the addition of water sufficiently to satisfy the demand of their customers — in quantity, if not in the quality.

The amount of adulteration found at this time in the stores and shops was unusually large, and many of our private families were very fortunate if they escaped the milk pressure with only twenty-five per cent. of added water.

On the 18th and 19th of the month the hearts of our people were gladdened by an easterly storm, giving us rain in abundance, which revived vegetation, until then drooping and ready to perish.

The month, however, closed with its general character, — hot and dry, — with a constant demand from the consumers for more milk.

August, 1873. For the first few days the weather and the supply of milk continued about the same as for the last month.

In very hot, sultry weather, milk requires skilful management; and even with persons of long experience not a little is lost, or at least becomes nearly worthless, especially at this season of the year, from contaminating influences over which those in charge have no control. Hundreds of cans of milk in stores, delivered as good milk, is allowed to per-

ish during the hot season, from ignorance, and the want of care in its management.

The care of milk is too often thought of but little consequence, as the milkman is obliged to replace that which is unfit for use with fresh milk.

The loss in these cases must fall heavily on some one, and, generally, it falls on those who are the least able to bear it. In the general inspection of the milk in stores and shops, during this month, it was found that milk which was left by the milkman at an early hour in the morning would become so changed before ten o'clock as to be entirely unfit for use. This milk is generally left at the shop door; where, exposed to the sun perhaps, it remains until the place is opened for business. The cans of milk are taken in and placed in a large ice-chest, which, amongst other things, contains a large stone jar, kept for the purpose of holding the milk.

This ice-chest is found to contain almost everything destructive to the milk; foul odors of every description arising from cooked and uncooked meats, and partially decayed fruits and vegetables.

The delicate composition of the milk cannot long survive such foul treatment, and it is not surprising that large quantities are daily returned to the milkman, to be replaced by a fresh supply, soon to share the same fate.

About the middle of the month the weather was cooler for a number of days, and a cold north-east rain-storm greatly assisted in bringing about more favorable weather for milk, which soon lessened the demand, and gradually increased the supply from different sections of the country, so that the improvement in the quality of the milk was noticeable in all parts of the city.

In April, 1868, a new milk-car was placed on the Boston and Albany Railroad, by an association of the farmers of Westboro'. This car has been transferred to other parties, who, during the short season of milk, extended their resources for

supplies to more distant parts of the country; thus coming to the rescue with their increased stock of milk at a time when it was most needed.

From the 20th to the close of the month the weather was variable, with the exception of a few warm, pleasant days; and but few if any complaints were made in regard to the quantity or the quality of the milk.

September, 1873, came in much more favorably for a good supply of milk than the last month, and the weather was cool and comfortable, with frequent rains.

The general inspection of the milk this month was at East Boston; and much less adulteration was found than at any time during the preceding two months. The milk-cans, which arrive at an early hour in the morning in this section of the city, were visited, and a large number of cans of milk were examined, and the milk with one or two exceptions was found good. These cars bring in daily from three to four hundred cans of milk, which is nearly all, if not all, distributed to the citizens of the ward, and but seldom has any fault been found as to the quality.

On the 12th of this month a meeting of the directors of the Milk Producers' Association of Massachusetts and New Hampshire was held in this city, to decide upon the price of milk to be paid the farmers for the ensuing six months, from October 1st, and it was unanimously resolved that the price of milk at the station in Boston or Charlestown should be the same as last season, viz.: forty-three cents per can so long as the retail price in Boston should remain at eight cents per quart.

The middle of the month brought cool nights and mornings, and generally fine weather for ripening the fruits of the season. The supply of milk at this time with the dealers generally more than equalled the demand.

While examining the milk in both South and East Boston the cow-stables and cow-sheds were visited; and their limited

accommodations showed, more conclusively than ever, that neither of these places is suitable for the production of milk. Still, very many families in the neighborhood where these cows are kept, prefer this milk to that which comes in on the railroads, and are willing to pay for it a cent or two more per quart.

On the 24th of this month one of the milkmen that drives in from one of the towns near this city brought to this office a large can of milk, which he received as a part of his daily supply from one of his neighbors. This milk, on being analyzed, showed that it contained water intentionally added in one hundred parts, 45.74, and only 4 per cent. of cream instead of about 10 per cent., the usual amount found on pure milk.

The month closed with fine, pleasant weather, with the exception of a few days, which were dull and lowery, and with sufficient milk to satisfy all demands.

October, 1873. Generally, in the first of this month, the winter contracts and the advanced price of milk commence; but at this time the supply of milk more than equalled the demand, and, with favorable prospects for the future good supply of milk through the winter, the dealers generally continued the summer prices.

There were a few, however, who sold their milk at a small advance during the winter season.

At this time the pastures and fields afforded food and nourishment for cows nearly equal to the summer supply.

The moderate pleasant weather continued with few exceptions until the 20th of the month, when a long easterly storm prevailed; but with the temperature mild for the season. The supply of milk continued favorable for the dealers until the latter part of the month; when, although the weather was mild and pleasant, the supply of milk with some of the milkmen was very limited, owing, it was said, to some of

the producers keeping their milk at home for the purpose of making their winter butter.

All parts of South Boston were visited this month, and the milk was examined and generally found as free from adulteration as in any of the wards in the city, if we except the Sixteenth Ward (Dorchester).

It may here be observed that if families were firm and determined to be supplied with pure good milk, they could, with few exceptions, readily obtain it. But the fact is, hundreds are easily imposed upon, and are made to believe that all the milk delivered in the city is more or less adulterated, and, therefore, are perfectly willing to consume their share of it, rather than consent to an immediate discharge of their milkman.

By request the Inspector this month visited a family two or three times in regard to their milk, which was found extended to the amount of 12 or 15 per cent. of added water, and contained but a small proportion of cream. The lady of the house made it a point the following morning to wait on her milkman, and, with some good advice, informed him that his services would no longer be required in supplying her family with milk. He plead earnestly for one more opportunity to redeem his lost reputation; but the verdict had gone forth, and there was no appeal therefrom.

If other families would but follow the example of this one, the milk-dealers would soon learn that pure milk is the only standard by which they can retain their trade and give satisfaction to their customers.

November, 1873. The moderate pleasant weather of the last month continued until the 8th of this, when an easterly storm brought considerable rain; so that up to this time the cattle could obtain nourishment from the fields and pastures, and in general the dealers in milk were well supplied.

The middle of the month was very cold and blustering, and some few days were as cold as winter itself.

The supply of milk continued sufficiently large, and many of the dealers considered the prospects for an increased demand for milk through the winter at renumerative prices very doubtful. The weather on the last ten days of the month, with very few exceptions, was cold and stormy. The 27th day was the annual Thanksgiving. The recurrence of this day in former years caused a demand for extra quantities of milk; but, for the past few years, the dealers, by a little management beforehand, have succeeded in having a sufficient supply of milk to meet the wants of their customers.

As a result of the scarcity above named, a large portion of the milk distributed in stores and families was adulterated to an enormous extent; and not a little was retained in the hands of the dealers from day to day and then distributed to customers — old, and so changed as to be unfit for use.

The afternoon previous to Thanksgiving, in November, 1866, one of our citizens brought to this office a can of milk which was left him by his milkman, which on analysis was found to contain 51.17 added water in one hundred parts. This man persisted in the statement that this can of milk was one which he himself bought of a brother milkman. However, he went through the court and paid his fine and cost. The increased demand for Thanksgiving milk being over, he was requested by the Inspector to buy of the same man one more can of his milk, which he did. The milk was analyzed, and the adulteration amounted to 30.24 of added water in one hundred parts. This man also went through he court, and soon left the business in disgust.

This month, as a whole, was remarkably cold and stormy, ut the complaints in regard to the quantity or the quality of he milk were few.

December, 1873. The weather for the first few days was

very cold. There was, however, but little if any complaint with the dealers in regard to the supply of milk.

The Milk Producers' Association of Massachusetts and New Hampshire held their sixth annual meeting in this city on the 2d day of the month, the object of which was to consider as to the price of milk and the matter of a more direct and cheaper transportation to market.

On the 4th day of the month the thermometer rose to 63 degrees, and the weather continued mild, with an average quantity of rain, but with not more than an inch of snow; so that the surface of the ground was at times dry and dusty.

The middle of the month was a succession of unusually moderate, pleasant days, with few exceptions. The milk-stations in Boston and vicinity brought in sufficient milk to satisfy all demands.

The latter part of the month was remarkable for its mild, pleasant weather, with the exception of the few last days, which were cold, and the weather variable; but this month, as a whole, was a wonderful contrast to the preceding.

In January, February and March there is but little demand for an extra quantity of milk, and the open, moderate weather this winter has been favorable for a larger supply than usual at some of the milk stations, while at others the demand for milk more than equalled the supply.

In general, however, the milk trade with many of the large dealers was considered very dull throughout the winter months.

The milk stations have been visited a number of times in the course of the winter, and a large number of cans examined, and with few exceptions the milk has been found good.

Those dealers who obtain their supply of milk at these stations generally scrutinize its quality very closely, especially at this season of the year, to see whether or not a change to some other milk station would be desirable before the

summer contracts for milk commence, which is on the first of April.

The facilities for obtaining our milk supply by the railroads this winter have been made more favorable than for some of the past seasons, when the milk trains have been so obstructed by the deep snow as to be many hours late on their arrival; and sometimes they have been detained on side tracks for a number of days, thus depriving our citizens of their supply of milk at the usual time, to their great inconvenience and vexation.

The following valuable information in regard to milk and its adulteration has been received from Mr. John M. Merrick, of Messrs. Merrick and Gray, consulting chemists of No. 59 Broad street, Boston. He says: —

"In accordance with your request, I send you a tabular statement of the results of the analyses of milk, which we have made from samples furnished by you, commencing April 4th, 1873.

Analysis Mark & No.	Specific Gravity.	Per cent. of Cream.	Sugar, Salt, and Ash.	Total Solids.	Water.	Per cent. of added water.
306	1.024	5 per cent.	4.28	8.94	91.06	43.18
307	1.020.9	6.5 "	4.28	8.49	91.51	48.66
308	1.028	5 "	5.04	10.40	89.60	35.86
309	1.025	10.05 "	5.50	12.13	87.87	15.00
310	1.026	3.70 "	4.74	8.72	91.28	49.62
311	1.029	6 "	5.41	10.64	89.36	33.81
312	1.025	3.05 "	4.64	9.59	90.41	37.35
313	1.028	6 "	4.77	10.58	89.42	26.46
314	1.026	6 "	5.09	9.36	90.64	45.95
315	1.026	5 "	5.09	10.54	89.46	27.34
316	1.027	4½ "	5.69	11.47	88.53	22.94
317	1.023	9 "	5.04	12.00	88.00	7.20
318	1.022	12 "	6.98	12.30	87.70	7.00
319	1.026	7.10 "	4.11	10.45	89.55	15.50
320	1.025	6 "	5.43	10.64	89.36	30.54
321	1.026	7.50 "	5.27	10.57	89.43	29.34
322	1.025	5 "	5.23	9.91	90.09	37.60
323	1.028	3 "	4.72	9.72	90.28	33.34
324	1.024	6.5 "	4.49	9.31	90.69	35.74
325	1.025	4.50 "	5.04	9.68	90.32	38.13
326	1.026	7 "	5.27	10.60	89.40	28.94
327	1.026	11.50 "	5.62	11.99	88.01	15.07
328	1.024	8 "	2.95	9.25	90.75	16.00
329	1.026	8.50 "	4.28	10.38	89.62	18.70
330	. . .	6 "	4.87	9.70	90.30	35.60
331	1.020	6 "	3.88	8.38	91.62	40.00
332	1.023	7 "	4.46	9.46	90.54	33.34
333	1.024	8.50 "	7.70	15.70	84.30	00.00
334	1.021	4 "	4.27	8.34	91.66	45.74
335	1.025	7.50 "	4.75	9.98	90.02	30.27
336	1.026	5 "	4.66	9.97	90.03	29.20
337	1.025	6.5 "	4.90	10.43	89.57	26.27
338	1.024	8 "	4.04	9.16	90.84	35.74
339	. . .	5.50 "	3.81	9.93	90.07	19.40
340	1.024	6.1 "	4.32	9.78	90.22	27.20
341	1.024	4.8 "	4.20	9.20	90.80	33.34
342	1.014	10.00 "	4.5	7.98	92.02	33.67

"In addition to the facts given in the above table, we have to say that, in no case, have we detected any adulteration except the addition of water, and in one or two cases a very trifling amount of salt and burned sugar. The amount of the admixture of milk with water seems to depend somewhat upon the dryness of the season. If there come a very dry and hot spell in summer, it is generally the signal for adulteration to begin.

"The method of analysis pursued is the following: The specific gravity is determined by weighing a measured quantity, with proper precautions, upon a delicate balance. This factor has varied between 1.014 and 1.029. The specific gravity of a sample of milk does not tell much about its character, further than this: that if it be very low, it is a suspicious fact, and calls for closer investigation.

"The normal specific gravity of milk is about 1.029; but it is lowered by the addition of fat (cream), so that the strippings, *i. e.*, the last portions of milk wrung out of the udder at the end of milking, may have a specific gravity of only 1.020, and yet contain solids to the amount of 18.74 per cent.*

"2d. The determination of the cream is made by pouring a quantity of milk into a glass tube, graduated into hundredths, and reading off the volume of cream, after leaving the tube at rest a proper time. The percentages of cream, which it should be borne in mind are percentages by volume, have varied from 3 to 12 per cent.*

"In thirty-five samples analyzed by Dr. C. F. Chandler, for the New York Board of Health, during the last four months of 1869, the cream ranged from 5.20 to 11.80 per cent. Taking out four samples, viz., 310, 312, 323 and 334, from the above table, would give a much more respectable average for the remainder. No samples of cream, as such, have been brought to us for examination during the past year.

* See on this point J. Alfred Wanklyn, Milk Analysis, p. 10, London: Trubner, etc., 1874.

"3d. Determination of the total fixed constituents of the milk. The method we adopt is to dry down 10 cubic centimetres of milk, in a small platinum dish, at 100° C., — until apparently quite dry, and then weigh the residue repeatedly until a constant weight is obtained. The percentage of solids, caseine, fat, sugar and ash, vary between 8.38 and 12.30.

"The determination of the total solids in milk admits great exactness. In five analyses of one sample the variations did not exceed four hundredths of a per cent.

"We believe it better to take 10 cubic centimetres for this step in the analysis than 5, as recommended by a recent high authority, as it not only lessens possible error in measuring, but gives a more satisfactory amount of residue for further operations.

"4th. The caseine and fat are determined jointly by coagulating with acetic acid 30 cubic centimetres of milk, adding 30 centimetres of warm water, and after thorough and vigorous stirring and agitation, filtering and determining the weight of the precipitate and filter, dried at 100 C., which, minus the previously ascertained weight of the filter, gives the weight of the fatty matter and the caseine. The use of an excessive amount of hot water to wash the precipitate introduces an error at this step,* and is to be avoided, recent researches showing that caseine is not wholly insoluble in water.

"The percentage of caseine and fat subtracted from that of the total of solids gives the milk-sugar and the ash. The percentage of ash, it should have been said, is obtained by igniting the residue left in the platinum dish, viz. : the total solids.

"The organic matter of this residue, the caseine, sugar and fat, is consumed, leaving the mineral or inorganic constituents of the milk.†

* See R. Pribram, vierteljahresschrift für prakt. Pharm. B. d. 19. s. 365. Zeitschrift für analyt. chem. (Fressenius) 1872, s. 109 et seq.

† Viz : Phosphate of Lime and chlorides.

"If carbonate of soda or other mineral adulteration be added to the milk, it will be detected here by the abnormal amount and character of the ash. In no case have we found the ash redundant, but always below the normal amount, showing no great quantity of salt, even, if added to the samples that came under our inspection.

" 5th. The amount of absolute water contained in the milk is found by deducting the percentage of total solids from 100. This amount varies from 91.66 per cent. to 87.70 in the samples we found adulterated; one sample in the table, No. 333, containing only 84.30, and proving perfectly pure milk.

" It is perfectly fair to assume that milk to be marked pure should have at least 7.5 per cent. of joint caseine and fat, or 9.3 per cent. of solids, not fat., viz.: caseine, milk-sugar and ash together. Any falling below either of these ratios indicates adulteration.

" By the labors of Bourchardat and Quevenne, Vernois and Becquerel, and the later works of Pribram, Müller, Boussingault, Muter and Wanklyn, milk analysis has been simplified and perfected till it is not inferior in accuracy to any department of proximate analysis.

" The following figures may be adduced in support of his assertion.

" Pribram obtained in two analyses the following very satisfactory results, viz.: —

	1.	2.
Caseine,	2.666	2.6595
Fat,	2.204	2.203
Milk-sugar,	2.709	2.700

" His method to be sure is complex, but the results are gratifying.

" The results given in our table above are themselves the strongest proof of the necessity of the frequent examinations and analyses of the milk brought to this city.

"Dr. Chandler estimates that, in 1869, the people of the city of New York paid $4,000,000, or about $12,000 per day, *for water* bought under the guise of milk.

"Of fifty-six samples of milk furnished to the London work-houses in 1872, only fifteen were found to be unwatered; *nine* of these fifteen had been skimmed, leaving only six that were genuine; that is to say, about 10 per cent. of the milk had not been meddled with. The same results followed the analyses of about one thousand samples in 1871 and 1872.

"The government in England has taken the matter vigorously in hand, and undoubtedly will do something to check this imposition, but it has been found here, and will be found there, that constant vigilance is the price of pure milk, constant watching, inspection and analysis.

"It remains to be seen whether a new industry which has sprung up within a year, viz.: the artificial production of butter, will have any effect upon the quality and amount of milk supplied for family use. This new process, which has been put into practice, working on a large scale in different parts of the country, gives a butter which cannot be distinguished from the product of the dairy, even by experts. We have recently examined a sample, and by looks, smell and taste could not find anything in it suspicious, or which would lead us to suspect its artificial origin.

Very respectfully yours,
JOHN M. MERRICK,
of Merrick & Gray,
Consulting Chemists."

A practical treatise has been recently published on the examination and analysis of milk, by J. Alfred Wanklyn, M. R. C. S., etc., etc., from which the following extracts are taken: —

"Milk exhibits great constancy of composition; the effect

of variations in the diet of the cow showing itself in the amount of the secretion rather than in its quality. This is very strikingly manifested on making a comparison of the milk yielded by the poor and ill-fed Bengali cows in India with that given by our own highly-fed beasts in this country.

"Dr. Macnamara's analyses of the milk of the Bengali cows show that it hardly differs from the milk of English cows in quality, whereas in quantity it differs greatly, the yield of milk from the former being a small fraction only of that from the latter.

"The milk of an animal has probably very much the same constancy of composition as the blood of the animal. It is well known that, by administering water to an animal, we are not able to dilute its blood to any considerable extent. Instead of telling on the blood, the water tells on the perspiration, or on the urine, so that from containing four or five per cent. of solids, the urine may become so diluted as to contain only one per cent. of solids.

"The milk resembles the blood in this respect, and is in contrast with the urine; and, by giving an animal an excess of water, we do not dilute its milk, but its urine.

"As will be readily comprehended, this constancy of composition is a cardinal fact in milk analysis. If milk were variable in strength, as the urine is, chemical analysis would fail to detect the watering of milk. That milk is a secretion of constant, or only slightly varying composition lies at the very root of the subject of this treatise.

"THE MILK SUPPLY OF THE LONDON WORK-HOUSES.

"Having had occasion to examine a large number of specimens of milk during the year 1871, it possibly may not be deemed to be unworthy of the attention of those chemists who may have a like task before them.

"The two common forms of malpractice which occur in the milk trade are the practice of removing the cream from the milk, and the practice of diluting the milk with water; and the testing of milk resolves itself into the detection of skimming and watering, and the measurement of the extent to which these operations have been carried.

"The possibility of detecting whether or not a specimen of milk has undergone impoverishment depends obviously on the possibility of assigning a normal composition to milk, or, at any rate, on the possibility of fixing limits beyond which the composition of milk does not vary.

"From the observations of Alexander Müller and Eisenstuck, who carried out an investigation for the Royal Agricultural Society of Sweden, it appears that the milk yielded by a herd of cows remains very constant in composition throughout the year. A daily analysis of the milk given by fifteen cows, of different breeds, but uniformly well-fed, exhibited the percentage of solids in the milk as never once during the entire year having fallen so low as 11.5. The highest percentage of solids was 14.08. Only four times during the year did the solids fall below 12 per cent. The average was 12.8 per cent. My own observations, made on an entirely different plan, fully bear out the statement that cow's milk does not fall so low as 11.5 per cent. of solids, and seldom so low as 12 per cent.

"The following analyses may be published: —

No.	Date.	Description.	Cream.	Per cent. Solids at 100 C.	Ash.
1	17th February, 1871.	D. R.	10	12.24	0.76
2	18th " "	D. R.	. .	12.04	0.68
3	21st " "	Cambridgeshire.	16	12.28	. .
4	" "	Surrey.	11	12.22	. .
5	" "	Herts.	11	13.08	. .
6	" "	Essex.	11	11.80	. .
7	" "	"	. .	14.34	. .
8	March, "	Country milk.	9.08	12.45	0.71
9	" "	Town-fed milk.	13.0	14.07	0.74
10	April, "	Alderney milk.	11.5	12.65	0.70

"The first two specimens, named D. R., were specimens of milk brought from milk-dealers believed to be perfectly honest. The next five specimens were samples of milk produced on farms in the different counties named in the table. Specimen 8 is a sample, taken by myself, out of some fifty or sixty gallons of milk fresh from the country.

"Taken together, the ten analyses represent the composition of an immense quantity, and of a great variety of milk, and support the conclusion arrived at in Sweden by Müller and Eisenstuck.

"POISONOUS MILK AND MILK PANICS.

"It is known that violent mental emotion exercises an unfavorable influence on the secretion of the mammary gland; and a fit of anger has rendered the milk of the human mother poisonous to the child.

"No doubt the milk of the cow is more or less liable to similar influences; and cows which are giving milk should not be driven or harassed in any way. Diet, too, has an effect on the quality of the milk; a purgative administered to the mother often taking effect on the child. Poisonous herbs

fed on by the cow contaminate the milk; and a very well known example in point is afforded by turnipy butter, which derives its very objectionable (though not poisonous) properties from turnips on which the cow has happened to be fed. All this tends to show the importance of attending to the health of milk-giving cows, and to the kind of fodder on which they are fed.

"Milk, after it has been yielded by the animal, may suffer contamination at a later stage. A case is recorded where, in the process of milking, which was performed by persons recovering from scarlet fever, the infection of scarlet fever was conveyed by milk to the children who drank it. This is, I believe, authentic enough.

"In addition to these genuine instances of milk-poisoning, a very subtle kind of poisoning has been described. It has been said that if a very minute quantity of water from a foul well be mixed with a very large quantity of milk, the whole mass of milk will become poisonous.

"And, as it is well known, considerable alarm has been created in the west-end of London, by a report that the milk purveyed by a certain milk company had occasioned an outbreak of typhoid fever in Marylebone, and the parishes adjacent to Marylebone.

"It is, however, important to record that the result of investigation has been to demonstrate the groundlessness of these alarms.

"The returns of the Registrar General, which are now before the public, show that Marylebone has seldom been so free from typhoid fever as during the period of the supposed epidemic.

"The history of this supposed epidemic of typhoid fever, or, as it would be more correctly designated, the history of the milk panic of 1873, is very instructive in many ways.

"Early in August, 1873, several children of an eminent west-end physician were ill of typhoid fever, and their father attrib-

uted the disease to the milk which they took. The doctor's family was supplied with milk by the Dairy Reform Company.

"On communicating his suspicions to neighboring medical men, and to the medical officer of health for the district, a number of cases of alleged typhoid were found among customers of the same dairy, a strangely large proportion of these cases occurring in the families of medical men. It was said that, naturally enough, the superior knowledge of the medical men was the explanation of the apparent preference of the disease for their families, and that by and by the anomaly would disappear, when the multitudes of unrecognized cases in non-medical families became sufficiently serious to force recognition of their real nature.

"The physician and the medical officers of health (in a most public-spirited manner, as it was called) addressed a peremptory order to the directors of the milk company to stop selling milk; the fears of the physician even reached the local government board, and an official investigation was ordered.

"Meanwhile the press took up the subject, and the medical papers and the non-technical newspapers vied with one another in sensational descriptions of the 'outbreak of typhoid fever,' its source, and the wickedness or recklessness of the milk company which had caused it.

"At the outset of the panic the leading journal published a list of twenty-three households, wherein inmates were said to have been poisoned by the Dairy Reform Company. With the assistance of my friend Mr. Cooper, I took the trouble to inquire into some of these cases.

"In one of these households there was no one ill, and there had been no one ill. In another household there had been only a little summer diarrhœa. In a third, the lady had been ill in Munich, where typhoid fever is known to be rife.

"In a fourth, where the servants were affected, the water in the kitchen was bad, the general supply to the house being

good. The servant had, moreover, been a day's journey into the country, during the very hot weather, and had been overheated. I did not pursue the investigation further.

"The official report on the condition of the farms, whence the milk company derive their supply of milk, has not yet been published.

"A gentleman who attended on behalf of the Dairy Reform Company has, however, written to the 'Times' newspaper a letter purporting to give an outline of the conclusions arrived at by the commission.

"From this letter we gather that at the time of the inquiry there were no cases of typhoid on any of the farms, and that there had been no recent cases.

"Instead, however, of calling public attention to that most satisfactory result of the inquiry, the writer of the letter dwelt upon a very doubtful case which had occurred on one of the farms at a rather remote period.

"The supposed epidemic was alleged to be at its height about the 10th of August, and before the beginning of August nothing had been heard of any epidemic.

"On the supposition of infection from one of the farms, we should hardly look for the case before the beginning of July. The case, however, to which the writer of the letter directed attention, dated as far back as before the 8th of June. The case in question was that of the farmer who had occupied one of the farms, and who died on the 8th of June. Even the nature of his illness is involved in doubt.

"The man's death, indeed, is entered on the register as caused by heart disease, from which he had been known to have suffered for at least a year; and the suddenness of his death is quite in accordance with the register. Some few weeks before his death he had an attack of diarrhœa, of a suspicious character, and that circumstance was seized upon as a reason for setting down his case as one of typhoid fever.

"It is, however, hard to believe that the excreta from this man can have poisoned the farm well, and the water from that

well should have poisoned the milk which was sent to London; and the wonder becomes the greater since the water from the well was occasionally, though not usually, employed for domestic purposes.

"As already mentioned, the reported case of typhoid occurred very much too early to account for what was called the London outbreak.

"It is very curious to observe that the termination of the outbreak did not accord with the theory. That which was designated the 'infected milk' ceased to be supplied to London on the 11th of August, and forthwith, within two or three days, the epidemic was reported to have declined.

"The period of incubation in typhoid fever is ten days, or thereabouts, therefore the stoppage of the poisoning on the 11th should not have been felt till towards the 21st.

"It has been mentioned that when the returns of the Registrar General were published, the mortality in Marylebone from typhoid fever was found to have been lower than usual.

"The following are the returns, week by week, embracing the whole period of the panic.

"Population of Marylebone, 159,254.

"The deaths from typhoid fever in Marylebone were as follows: —

"During the week ending 5th of July	0
" " " " 12th "	1
" " " " 19th "	2
" " " " 26th "	0
" " " " 2d of August	1
" " " " 9th "	1
" " " " 16th "	3
" " " " 23d "	2
" " " " 30th "	2
" " " " 6th of September	2
"Total during the ten weeks	14

Being at the rate of rather less than one per 100,000 per week.

"A poison which does not poison if you take it in aqueous solution, but poisons a whole township when that same aqueous solution is diluted with milk, a hundred or a thousand fold, and whose period of incubation is sometimes two months and sometimes three days, according to the exigencies of your case, must be singular indeed.

"And when such a poison seems to have ravaged a whole parish, it marks its ravages most appropriately by a diminution in the death-rate."

In closing this report, your Inspector would acknowledge the hearty co-operation of the Superintendent and officers of the Health Department; and also the kind assistance rendered by the prosecuting attorneys and officers of the courts.

I feel obliged especially to mention the valuable services rendered by Messrs. Merrick and Gray, chemists, whose analyses of milk have been relied on in the trial of cases arising under the milk law, and for their personal kindness and courtesy, that have marked the intercourse of the year. My thanks are also due the Police Department for their promptness in affording information, and their ready assistance in carrying out the object and intent of this office.

Respectfully submitted,

HENRY FAXON, *Inspector*.

City Hall, Boston, March 31st, 1874.

City Document. — *No.* 43.

CITY OF BOSTON.

SIXTEENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

1875.

CITY OF BOSTON.

To His Honor the Mayor and the Board of Aldermen of the City of Boston: —

Gentlemen, — The undersigned respectfully submits the annual report of his office for the year commencing April 1st, 1874.

The laws of this Commonwealth require that all Inspectors of Milk shall keep an office and books for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits.

The Inspector is also required to prosecute before the proper tribunal all such violations of the law as shall come to his knowledge; and to keep proper books of account, and record of all matters pertaining to his office; which said books shall always be open to the inspection of the Mayor and each of the Aldermen, and shall be transmitted to his successor in office.

It has been my constant endeavor that this law should be fully complied with.

The milk dealers in the recently annexed territories of Charlestown, Brighton and West Roxbury have been registered, and are included in this report.

In consequence of the magnitude and extent of the milk business in this city, and for convenience and system, the milk trade is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

1st. Wholesale dealers are those who distribute to families, stores, etc., from carriages, and those who keep more than one cow, in the city proper, in the Sixteenth Ward (Dorchester), Boston Highlands, South Boston, East Boston, Charlestown, Brighton, and West Roxbury.

2d. Retail dealers are those who sell in small quantities from market places, stores, shops, and cellars.

Number of cows kept within the limits of the City of Boston	1,891
Viz.: number in the city proper	28
Number in the Sixteenth Ward, Dorchester	604
Number at the Boston Highlands	420
Number at South Boston	100
Number at East Boston	158
Number in the Charlestown District	23
Number in the Brighton District	163
Number in West Roxbury District	395
Number of persons who keep but one cow	517
There have been recorded the names and places of business of wholesale dealers in milk, since the last report	201
Whole number of wholesale dealers registered	1,582
Whole number of wholesale dealers now in the business	725
Whole number of wholesale dealers now selling from carriages	360
Whole number of small wholesale dealers who keep more than one cow and sell to the neighborhood	365
Whole number of retailers in milk recorded since last report	170
Whole number of retail dealers in milk recorded to date	3,324
Number of samples of milk inspected since last report	2,041
Number not adulterated	1,625
Number more or less adulterated	416
Number of cases analyzed by chemist	23
Average amount of adulteration in the cases analyzed	19.38

Largest amount of adulteration (water intentionally added in 100 parts in the cases analyzed)	40.00
Least amount of adulteration (added water) in the cases analyzed	1.34
Number of samples analyzed, including above, and not adulterated	1.00
Whole number of samples of milk analyzed to date	365
Number of cases pending in the courts at the date of last report	2
Settled during the year favorably to the government	0
Number of complaints in the Municipal Court	5
Number convicted in the Municipal Court	5
Number of complaints to the Grand Jury	6
Number of bills of indictment by the Grand Jury	5
Number convicted in the Superior Court	3
Number placed on file in the Superior Court	2
Whole number of complaints in court to date	275
Whole number convicted to date	203
Whole number not convicted	70
Number of cases now pending in the courts	2
Number of gallons of daily supply of milk for the City of Boston	34,578
Daily cost to consumers	$11,064 96
Number of gallons for supply one year	12,620,970
Cost to consumers one year	$4,038,710 40

The expenses of this office have been as follows, viz. : —

For the analyses of milk	$210 00
Stationery, record books, advertising, printing etc.	165 75
Inspector's small bills for assistance, lactometers, and other milk instruments	59 06
	$434 81

For violation of the milk law there have been paid in the Municipal and Superior Courts, fines and costs amounting to $659 90

One half of the fines have been paid to the complainant, viz. $265 00

The State of Massachusetts has been the pioneer in enacting laws in relation to the sale and inspection of milk; and the City of Boston has ever been ready and willing to assist in executing all laws and enactments for the health of her citizens.

Since the establishment of this office, August 10, 1859, many of the other States have enacted laws similar to our own, and their cities have availed themselves of our experience in the establishment of offices for the inspection of milk, and the detection and conviction of dealers in the adulterated article.

For the benefit of all persons interested in the sale of milk, your Inspector may be allowed to incorporate in his report from year to year the existing laws of the State, and such matters as may be of interest to persons in distant parts of our country as well as to those nearer home.

Extracts from ACTS in relation to the Sale and Inspection of Milk.

Be it enacted, etc., as follows: —

SECTION 1. The Mayor and Alderman of cities shall, and the selectmen of towns may, annually appoint one or more persons to be Inspectors of Milk, for their respective places, who shall, before entering upon the duties of their office, be sworn. Each Inspector shall give notice of his appointment by publishing the same two weeks in a newspaper, published in his city or town; or, if no newspaper is published therein,

by posting up such notice in two or more public places in such city or town.

SECT. 2. The Inspectors shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They may enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof, and cause the same to be analyzed, or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admissible in evidence in all prosecutions under this act.

The Inspector shall receive such compensation as the Mayor and Aldermen or Selectmen shall determine.

SECT. 3. Repealed by acts of 1867.

SECT. 4. Whoever neglects to cause his name and place of business to be recorded in the Inspector's books, and his name legibly placed upon all carriages used by him in the conveyance of milk, before engaging in the sale thereof, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence fifty dollars.

And whoever offers for sale milk produced from cows fed upon refuse of distilleries, or any substance deleterious to the quality of the milk, or whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first, and fifty dollars for every subsequent offence. And whoever, in the employment of another, knowingly violates any provision of this section, shall be held equally guilty with the principal, and suffer the same penalty.

SECT. 5. It shall be the duty of the Inspector to cause the name and place of business of all persons convicted under the preceding section to be published in two newspapers

printed in the town or county where the offence may have been committed.

Sect. 6. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved March 30, 1864.

INSPECTION OF MILK.

(Chapter 319.)

An Act to prevent the sale or exchange of adulterated milk.

Be it enacted, etc., as follows: —

Section 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine, not less than twenty, nor more than one hundred dollars. And for any subsequent offence by a fine of not less than fifty, nor more than three hundred dollars.

Sect. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalties provided in the preceding section.

Sect. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty, nor more than three hundred dollars, and for any subsequent offence by a fine not less than one hundred dollars, and imprisonment

in the House of Correction not less than thirty nor more than ninety days.

Sect. 4. Violations of this act may be prosecuted by complaint or indictment, before any court of competent jurisdiction, and one-half of any fine paid shall go to the complainant.

Sect. 5. All acts and parts of acts inconsistent herewith are hereby repealed, but such repeal shall not affect any prosecutions now pending.

Sect. 6. This act shall take effect upon its passage.

Approved May 4, 1872.

To carry out the good intentions of the law relating to the sale of milk, your Inspector has devoted his time during the year.

By the annexation of cities and towns the duties of this office have been largely increased. Notwithstanding the great increase, your Inspector has endeavored to be prompt in the discharge of the duties entrusted to his care, so that none should have just cause of complaint.

The stores, shops and cellars in all parts of the city have been visited during the past year, and the milk examined; besides this a large number of private families have requested the services of the Inspector at their homes.

Every day milk may be seen at this office under examination, brought in by families from different parts of the city, and not a little from the neighboring cities and towns.

We have now nine or ten railroad milk-stations, which supply us with a large proportion of our milk, all of which are located within the limits of the city, with the exception of those at East Cambridge.

To prevent the distribution of adulterated milk to our citizens, these milk-stations are often visited, and also the stables of the milkmen, not only in the city, but also in the neighboring towns.

Nearly every day milk may be found at some of these milk-stations which has been either watered or skimmed previous to its leaving the dairy.

Early in the season one of our large milk-dealers visited this office and informed the Inspector that two or three of his dairies, as he received them from the country, were badly adulterated, and that a number of times these dairies had been returned, and the parties notified as to their quality. As this milk was daily distributed to our citizens, I felt it my duty, if possible, in these cases, to commence at the fountain-head of the adulteration.

To this end your Inspector, with the usual milk collector, visited the adulterated milk places, in one of which six large cans of milk were found ready for the market; at the other place four cans were awaiting removal by the collector. These ten cans of milk were taken to the country milk-station and examined, and were found extended by the addition of water. One sample from each of these dairies was brought to the city, and analyzed by the city chemist. The first sample was found to contain added water in one hundred parts 25.50, and the other 32.80.

These cases were carefully prepared, and brought to the notice of the courts in the counties to which they belonged. In one case the offender was convicted, *and fined five dollars* and costs; and in the other case, notwithstanding the positive evidence of guilt laid before the grand jury, they refused to find a bill of indictment.

This letting up (as it is termed) upon violators of the law should be condemned by every honest man, as it is making null and void the laws which are enacted for the protection of the community.

Again, when venders of adulterated milk are brought into court, where they have been several times before, and are allowed to depart upon *simply paying the cost of court*, having the indictment *placed on file*, it is a gross injustice,

not only to the parties immediately concerned, but also to the public in general.

During the winter of 1873, an act was passed by the Legislature, of which the following is a true copy: —

(Chapter 180.)

An Act concerning the purchasing of milk and the size of milk-cans.

Be it enacted, etc., as follows: —

Section 1. All milk-cans used by persons engaged in the business of purchasing milk at wholesale shall be sealed annually by the Sealer of Weights and Measures in the city or town where the purchaser resides, and no milk-can shall be sealed which does not contain one or more quarts, without the fractional parts of a quart; and the capacity of the can shall be legibly marked upon it by such sealer.

Sect. 2. When milk is purchased by the can, such can shall hold eight quarts of milk, and no more.

Sect. 3. Every person violating the provisions of this act shall be punished by a fine of not less than twenty dollars, nor more than fifty dollars; one-half of which fine shall inure to the use of the complainant.

Sect. 4. This act shall take effect on the first day of July next.

Approved April 14, 1873.

Whatever the effect of this law may have been, I have not heard that any complaints were made to the courts since its enactment, or that any effort was made for carrying out the intentions of the law; certain it is the milk-cans remain the same as in years past.

The following information, being useful from year to year, is inserted from my last report: —

"The contracts for the supply of milk are generally made twice a year, viz.: on the first of April and the first of October.

"The milk-cans used for the conveyance and sale of milk, by the dealers, are of two classes. The large cans, which hold nine quarts and a pint, are in general use by the milk-trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston.

"The smaller cans, which hold eight quarts and one half pint, are mostly in use on the Fitchburg, Lowell and Eastern Railroads; and no milkman is considered equipped for business unless he is the owner of four or five full sets of cans, either eights or nines, as above described, sufficient to contain the milk necessary for his daily route; one set being in use while the others are on their way to the country for a fresh supply.

"Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers; these are left within the houses, or at some designated place on the premises."

The price of milk has varied but little in the last two or three years; the increasing facilities of railroads and their branches, as they extend more and more into farming districts, are daily furnishing us milk from places heretofore not drawn upon, so that the price of milk does not advance in proportion to the increase of our population.

The price of milk last summer was about the same as in the year previous, viz.: at the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collecting and transporting it, from forty to forty-eight cents. This is sold by the milkmen to stores and shops at from fifty-four to sixty-two cents per can, and is retailed in smaller quantities to families, at eight cents per quart.

Although the above prices are such as were generally agreed upon, yet many of the milk-dealers, owing to the great competition in the trade, would buy and sell their milk at greatly reduced prices, governed only by supply and demand.

April, 1874. The first part of this month, the weather, with few exceptions, was cold and blustering with a number of severe storms. The weather on Sunday the 12th, and Monday the 13th, was very cold. The general supply of milk more than equalled the demand, so that very little adulteration was found in the stores, and but few complaints were received from private families in regard to their milk.

The middle of the month, with few exceptions, was cold and stormy; the 18th day the ground was well covered with snow. The month as a whole was remarkably cold and stormy, with, nevertheless, an abundant supply of milk.

The general inspection of the milk this month was at the Boston Highlands, in stores and shops. Two or three of the milk and water men were found with the extended article in their possession with intent to sell, and were passed through the court by paying the usual fine and cost.

I would here observe that the weather seriously affects the supply of milk as well as the demand; and often the quality is materially affected by the sudden changes in the weather.

May, 1874, commenced with cold, unpleasant weather, which continued, with few exceptions, up to the 13th day, when a few warm, pleasant days wrought quite a change, not only in bringing forward vegetation, but it also brightened the prospects of the milkmen for an increased demand for milk.

This month the stores and shops in the northern and western part of the city were visited and the milk examined.

Notwithstanding the increased demand for milk, the average amount of adulteration was found to be much less than in the corresponding month of last year.

During this month many samples of milk were taken from the milkmen at an early hour in the morning, as they were

delivering the milk to their customers, all of which, with two or three exceptions, was found good family milk.

The weather in the middle of the month and to its close, was, with few exceptions, cool and variable; the last few days, however, were warm and pleasant, and the month closed with an ample supply of milk.

JUNE, 1874, came in with cool weather and heavy rains, which, with few exceptions, continued until past the 20th of the month.

The quantity of milk was fully equal to the demand. The duties of the Inspector this month embraced a general inspection of the milk in the Charlestown district. Nearly every street in this part of the city contains stores and shops for the sale of milk, which were visited, and the milk examined.

All or nearly all of the names and places of business of the wholesale and retail dealers in milk were registered (as required by the Statutes of the Commonwealth) by the former Inspector of the City of Charlestown, and all matters appertaining to his duties were handed over to this office, April 1st, 1874.

In the first part of the month, some early morning calls were made to this part of the city, and samples of milk were taken from some of the milkmen, and analyzed by the city chemist; the result showed that the milk was largely extended by the addition of water.

The fact that the milk was found in their possession with evidence of intent to sell, was sufficient cause for complaints to be made to the courts, which brought them to a final settlement by the usual fine and cost.

While attending to the duties of my office in this part of the city, frequent calls came from private families, where their children were dependent upon the honesty of their milkmen for the quality of their daily food.

In the private families, and also in the stores and shops,

the milk examined would compare favorably with the milk found in other parts of the city.

It was thought by many persons in this section of the city that the prosecution of two or three of their milk and water dealers had a wonderful effect upon the quality of their milk.

The two or three last days of this month were extremely hot, with an increasing demand for milk; but thus far, the supply was about equal to the wants of all the customers.

July, 1874. The weather, for the first few days was hot and dry, with an increasing demand for milk. On the 5th of the month, a cold northeast rain-storm prevailed, followed by cooler weather and frequent showers, which again lessened the demand for milk. These showers were often accompanied by lightning and heavy thunder, which proved equally destructive to large and small quantities of milk.

The most of our large milk-dealers, however, are interested in some of the butter and cheese factories located in the neighboring towns, which have become an institution of considerable importance within the past few years.

When any of the dealers have a surplus of milk, or milk unfit for distribution, they return it to the station; whence it is taken to the butter and cheese factories, — whereby they effect a small saving.

A few days about the middle of the month the weather was unusually warm and pleasant. With some of the dealers the milk supply was quite limited.

The season, however, had arrived when many families leave the city for more genial resorts in the country; which affords considerable relief to the milkman, as it enables him to meet more liberally the wants of those who remain.

The general inspection of the milk in stores and shops this month was in the central part of the city and at the south end. Although the latter part of the month was very dry, hot and sultry, yet the supply of milk was sufficient to

meet all demands, and the adulteration was found to be much less than usual at this season of the year.

August, 1874. The first few days of this month were cool and pleasant; on the 8th, 9th, and 10th a cold easterly storm prevailed, affording an abundance of rain. The 11th and the 12th were extremely hot, after which the weather was again quite cool, with frequent heavy rains until past the middle of the month.

The cool wet weather, so unusual at this season, lessened very much the demand for milk, and at the same time increased the supply from the country; so that in visiting stores and shops at the south part of the city, the milk was found, with few exceptions, quite free from adulteration.

The weather from the 24th day to the close of the month was dry and cool, especially the nights and mornings.

The limited supply of milk, and the increased demand which usually exists at this season, have been obviated by the cool weather and copious rains during the month sufficient to keep the pastures in good condition for the nourishment of cows, thus affording a large supply of milk, more than enough for the daily wants of our citizens.

During my visits of inspection I found that many of the small places, in various parts of the city, where milk was formerly sold, had abandoned the sale of it in consequence of dealers being prohibited from the sale of liquor and ales, the profit derived on the sale of milk being too small for an independent business.

It was also found that the small profit derived from the sale of milk would not enable them to obtain ice at the exorbitant price then demanded, so that the milk in a few hours after being left would be unfit for use.

September, 1874. To the middle of the month was without rain; and with very few exceptions the weather was cool. Notwithstanding the dry weather, the supply of milk with nearly all the dealers continued abundant. On the 5th

and 9th days of this month I visited the milk-station at East Boston, and examined a large number of cans of milk, none of which were found adulterated; some cans, however, were examined, which had been robbed of their cream previous to their leaving the dairy.

From the 18th to the 21st of the month the weather was dull and lowery, with a little rain; not sufficient, however, to afford much if any relief to the exhausted wells and streams.

The pasturage in some of the milk districts, by the heavy dews and the light rains, continued to afford nourishment for cattle.

This month was devoted to the general inspection of the milk in stores and shops at East Boston; and the quality of the milk was generally found about the same as in other wards of the city.

A number of early morning calls were made on the milkmen in this part of the city, and samples of milk taken, all of which, with one or two exceptions, were found to be good family milk.

There has not been a year since the establishment of this office when the supply and demand for milk have been so uniform as throughout the present season. The milk trade amongst our milkmen has been very limited, and the extra price during the season has not exceeded six cents per can.

The cool, dry weather continued, with few exceptions, to the close of the month.

October, 1874, came in with cool, variable weather, with very little rain; but the season had so far advanced as to quiet all fears respecting any scarcity of milk.

On the first of this month the winter contracts, and the advance price of milk, usually commence; but this year, as in the two or three past seasons, the supply fully equalled the demand, so that many of the milkmen continued the

summer prices, while a few sold their milk at a small advance during the winter season.

It was said that some of the milk contractors agreed to pay the producers forty cents per can during November and December, and thirty-eight cents through October, January, February and March.

On the first of this month two of our long-established milk-dealers caused an additional milk-car to be placed on the Boston and Albany Railroad, which now brings in about three hundred cans of milk daily; which for quality will compare favorably with any received in the city.

The general inspection of the milk this month was at South Boston, and but little if any was found adulterated, worthy of notice; this may be in part owing to the fact that two or three of the milk and water dealers in this part of the city had recently passed through the courts, one of whom had been admonished by the payment of a fine and cost, amounting to three hundred and thirteen dollars.

From the 20th of this month to its close the weather was very moderate, pleasant, and remarkably dry.

NOVEMBER, 1874. The moderate, pleasant, dry weather of the last month continued, with the exception of two or three cool days, up to the 23d of this month, when the first snow of the season appeared, which amounted to two or three inches; the weather, however, soon moderated and was followed by rain, which continued throughout the day.

About the middle of the month with some of the dealers the supply of milk from the country was less than at any time during the season.

It was said that a considerable quantity of our usualf all supply was retained in the country for the purpose of making butter, which is not done to any great extent during the cold weather.

This month was mostly devoted to inspecting the milk in

the Brighton and West Roxbury districts, and recording the names and places of business of all dealers in milk.

Many in this part of the city are supplied from the same carriages that furnish the stores and families in the north and west part of the city proper. These men leave their milk on the way in from the towns in Norfolk and Middlesex counties.

The facilities also for keeping cows are better in these districts than in any other part of the city, and in this way many of the inhabitants supply themselves and their neighbors.

This month was one of singular clearness. There were in it fifteen clear days, eight cloudy, and seven rainy. The contrast between November, 1873, and November, 1874, was very striking. Last November was cold and wet, — the coldest for many years, — and during the month full five inches of water fell. This November has been the exact reverse of all this; it has been quite warm, and very dry, only an inch and one-sixth of water having fallen; and two-thirds of all that having fallen on the 23d day of the month.

The last week of this month the supply of milk was about equal to the wants of the consumers, although the annual Thanksgiving served to increase the demand; by previous arrangements of those interested in the trade, an abundant supply was obtained, and but few complaints were made as to the quality.

DECEMBER, 1874, to the middle of the month, if we except the 7th and the 14th days, there was moderate, dry, pleasant weather; the 14th was very stormy, but not sufficient rain fell to lessen the great demand for water; in fact the whole season has been characterized by the absence of water, so that a "water famine" has prevailed in many towns, and many families have learned for the first time that water supplies are not always sure, and that a want of

the article may be, as it has been, a source of much labor, care, and anxiety.

On the 8th of this month the New England Milk Producers' Association held its seventh annual meeting in this city. The President briefly addressed the meeting, in a way to encourage them to persist in obtaining a good price for their milk, and in perfecting a system of protection against adulteration.

The Milk Producers' Association of Massachusetts and New Hampshire also convened in this city in the early part of the month, and was addressed by the President, Hon. Daniel Needham, and others. The object of this meeting, like the other, appeared to be, not only to obtain a fair price for their milk, but also to prevent its adulteration, and likewise to obtain from the railroads a cheaper and more direct transportation to a market.

The quantity of snow in the month was half an inch on the 1st, 11th, and 13th, and an inch on the 20th, which soon disappeared; so that there was not any sleighing in the month, and the ground was generally dry and dusty.

The milk trade, with a large proportion of the dealers, was considered very dull, if we except the last week in the month, the anniversary of Christmas having had a tendency to increase the demand; yet the supply appeared sufficient, and the samples of milk taken from the dealers at this time proved to be good family milk.

Our citizens in general who have business with this office, and the milk-dealers in particular, will be pleased to learn that a female assistant has been granted for this office, whose duties commenced on the first of the month; so that hereafter milk can be received for examination, and dealers in milk can cause their names to be registered, as required by law, at any time between the hours of 8½ A. M. and 5 o'clock P. M.

JANUARY, 1875. The first week of this month the weather

was very variable; some days very cold, and others moderate, with some rain, hail, and snow.

In general the supply of milk fully equalled the demand, there being no call for an extra quantity in the winter season.

The average standard in different parts of the city was quite favorable, so that there were but few complaints of adulteration during the month; but many that the milk was old, and often skimmed when received.

The middle of the month, with few exceptions, was cold and pleasant.

The latter part and to its close was very cold, with an occasional snow-storm, but no rain; but, taken as a whole, this was the coldest January for many years.

February, 1875. The very cold weather of January continued, with but little change, up to the 20th of this month.

The weather the latter part of the month was variable; some days quite moderate, with some snow.

By request the Inspector visited a number of stores at East Boston in regard to the milk, none of which was found to have been adulterated; but some old milk was found, and some that had been frozen during its transportation from the dairies.

At this time at some of the milk-stations the supply was not equal to the demand.

A part of a large can of milk was brought to this office by one of the East Boston milkmen, who stated "that he had left this can of milk the morning previous at the store of one of his customers; a portion of it had been sold to some of the families in the neighborhood, and had caused sickness amongst their children." Considering this (so-called poisoned milk) sufficient cause for investigation, a sample was taken to John M. Merrick, the city chemist, for analysis, who says: "This seems rather a thin sample of milk, deficient in cream; according to our standard, it falls short

about 7 per cent. There is nothing in it, which a careful analysis can detect, which shows cause of symptoms of sickness or poisoning."

I may here observe that the best part of this can of milk had been sold previous to its coming to this office.

The Health Commissioners of this city received an anonymous letter, of the following purport: —

"Gentlemen, — I beg leave to ask your attention to the large amount of *swill milk* used in the city; one man residing in one of the neighboring towns keeping twenty-five or thirty cows fed entirely on *city swill*, and selling the milk to a milkman who retails it every day through the city. I think it a very unhealthy article of food, and its sale should be stopped at once."

The above communication was forwarded to this office for investigation.

It was found that these cows, to some extent, were fed on brewers' grains; a sample of this milk was immediately obtained after leaving the dairy, and was analyzed by the State Assayer, from whom the following certificate was received: —

"I have failed to find any adulterating material other than water in the within-described milk. I have also carefully examined it with the microscope, and it has every appearance of being pure milk of good quality. It is richer in cream than the average milk sold in the city. It is free from any objectionable odor or taste."

During the past sixteen years, many samples of milk have been obtained from cows fed almost exclusively on brewers' grains, and these samples were analyzed by Drs. Hayes, Carney and others.

The unanimous testimony of these and other scientific parties confirms the fact, that the milk from cows fed on brewers' grains is not deleterious.

March, 1875. The first and second days of the month the weather was cold, with a violent northeast snow-storm, but not sufficient snow to cause a delay to the milk trains of more than one hour or two beyond the usual time of their arrival.

On the 7th day another violent snow-storm prevailed through the night, the two storms covering the ground to a depth of more than a foot; this amount being much greater than had fallen at any time during the winter. Although this season has been remarkable for its continued cold weather, it has also been noticeable for the small amount of snow.

This being the closing month of the season, it may be of interest to look back and review the condition of the milk trade. It is admitted by all engaged in the business that it has been a season of general depression; even many of the large dealers have found it extremely difficult to collect money enough from their customers to pay the milk producer or the contractor for their milk.

The season, however, has been generally favorable for an ample supply of milk, the cold weather and the scarcity of money having materially lessened the demand.

The amount of adulteration has been much less than in any season since the establishment of this office; owing, in some measure, also, to the fact that our citizens will not use such milk as was dealt out to them by their milkmen a few years since. It was then believed that all the milk that was sold in Boston was more or less adulterated, and that there was no alternative for them but to submit and use such as was left them with as good grace as possible. This constant agitation of the subject of adulterated milk has been brought so frequently to the notice of our citizens by prosecutions,

convictions, and the advertising of the names of the offenders, that it has awakened a feeling of constant suspicion, with a desire to know whether they were being supplied with pure milk or not.

It has often been said within the past few years, by many of our citizens who have travelled abroad, and also by foreigners who have visited our city, that the milk sold from our stores, and that which is used in our families, is superior to that which is found in any other city in the world with a like population. If this be true, it certainly speaks well for the intelligence and good taste of our people, as well as for the utility — even necessity — of the law on this matter, and its rigid enforcement.

"*Instruments and Methods of Testing Milk, from a practical treatise on Milk and its Adulteration, by* J. Alfred Wanklin, M. R. C. S." He says, "The lactometer — or lactodensimeter as it has been called to distinguish it from another simple instrument, the creamometer — was at one time a great favorite. In France, a few years ago, if not indeed now, the police would take action at once on a reading of that instrument, and turn milk out into the gutter if it were condemned. And in London, the lactometer is exposed for sale in shop-windows, and both the public and milk-dealers trust to it. Even in some recent manuals intended for the guidance of medical officers of health, the use of the lactometer is recommended.

"In one of them in particular — Dr. Edward Smith's — which claims a sort of pseudo-government sanction, the lactometer is very prominently put forward, and commended as being for milk what the hydrometer is for alcoholic fluids.

"But although it is so very popular, and although it has been so implicitly trusted, the lactometer is a most untrustworthy instrument. There hardly ever was an instrument which has so utterly failed as the lactometer. It compounds

together milk which is exceptionally rich with milk which has been largely watered; and many a poor French peasant, bringing the best and unadulterated produce of his dairy into a French town, has been ruthlessly stopped by the police, who have dipped their lactometer into the milk, and forthwith sent it down the gutter, as if it had been milk and water. Very curious things, too, are done in this country by reason of trust in the lactometer. There is a prison not far from London, and the prison authorities are specially particular about their supply of milk. They allow no milk to enter the prison unless it comes up to the M. mark on a certain lactometer. The M. mark is pitched very high, and the milk purveyor reaches the M. mark by skimming the milk. A very little consideration will suffice to make intelligible the obliquity of the indications of the lactometer, and to show how untrustworthy it must be. The lactometer, as of course will be understood, is simply the hydrometer applied to milk; and readings of the instrument are neither more nor less than specific gravity.

"The more milk-sugar and caseine and mineral matter there is in a given specimen of milk, the greater (other things being equal) will be its density or specific gravity, and the higher the lactometer reading.

"If, however, fat globules (as happens in the instance of milk) be diffused through the fluid, then, because fat is lighter than water, the effect of the other milk solids on the gravity of the liquid will be more or less neutralized.

"The density of milk-fat is about 0.9, water being 1.0. Now, if a solution of caseine and milk-sugar, of specific gravity 1.030, be sufficiently charged with fat-globules, its specific gravity may be sent down even below the gravity of water.

"How much would be required to bring about such a result is a matter of simple calculation.

"This being understood, it will be obvious that if the speci-

mens of milk differ in specific gravity, there must be two distinct and equally valid ways of accounting for the difference. The milk with the lower gravity may be milk let down with water, or let down with fat, — *i. e.*, milk let down by being enriched.

"By way of example, I would first refer to the specific gravity of the so-called strippings, which are the last portions of milk wrung out of the udder at the termination of the milking. These are richer in cream than the average mass of the milk, and they have a much lower density than average milk. I have myself examined strippings with a specific gravity of 1.020, and a specific gravity of 1.025 is by no means uncommon.

"In the instance of strippings of the latter gravity, I found the percentage of solids to be 18.74.

"Now, if all we knew concerning a sample of milk was that its gravity was 1.025, we might with equal reasonableness conclude, either that it contained 15 or 20 per cent. of extraneous water, or that it was surcharged with cream.

"If, by adding fat to milk, the specific gravity is lowered, it follows that by subtracting fat (*i. e.*, by skimming) the specific gravity is raised; and hence the explanation of the reaching of the high M. mark by skimming.

"A certain trick of the milk trade is fostered by the employment of the lactometer. The milk is partially denuded of cream (accomplished conveniently by adding a certain quantity of skimmed milk to the fresh milk), and thereby raised in gravity. That being accomplished, it is dosed with water, and its gravity is thereby lowered to the normal standard. Let no one think that he would discover such a trick by making an estimation of cream; for watered milk throws up its fat in the form of cream more perfectly than unwatered milk. Another objection relative to the lactometer (which, however, pertains to the application of the hydrometer to organic fluids generally) is drawn from the

circumstance that a comparatively small change in density corresponds to a great change in composition. Making total abstraction of the difficulty and uncertainty dependent on the cream, and regarding milk as a solution of caseine and milk-sugar, it will be seen that whereas the specific gravity of water rises only from 1.000 to 1.032 in passing into milk, the water receives 9.2 per cent. of milk solids. In other words, whilst the density goes up only 3 per cent. the solids go up 9 per cent. It is therefore, disadvantageous to estimate rise in solid content by rise in density.

"Mineral substances, when they dissolve in water, raise the density far more rapidly than organic substances. The contrast in this respect is very well shown when chloride of potassium is compared with milk solids. Thus a 10 per cent. solution of chloride of potassium has a specific gravity of 1.065 at 15 per cent., whereas a 10 per cent. solution of caseine and milk-sugar has a specific gravity of about 1.035.

"To be of any value at all, a specific gravity determination in the case of such a fluid as milk must be taken with extreme accuracy, and as is well known, the taking of specific gravities with great accuracy is not by any means one of the most facile of operations, and is certainly not easier than the taking of solid residues directly.

"*From a careful consideration of the whole subject, I am convinced that one of the most necessary steps to be taken in milk analysis is to abandon the use of the lactometer.*

"*The creamometer* is a graduated tube, in which milk is allowed to stand and throw up cream, the volume of which is afterwards to be read. It is, of course, unnecessary for the graduation to be continued throughout the whole extent of the tube. If the graduation be prolonged only for the uppermost 15 per cent., that will be amply sufficient for all practical purposes.

"Normal milk yields about 10 per cent. of cream; but

that is subject to great irregularity, and a milk may yield very much less without having been tampered with, or it may yield the 10 per cent., and, nevertheless, have been tampered with.

"The creamometer is at best a treacherous guide. In addition to the lactometer and the creamometer, there is likewise an instrument, the indications of which depends on the degree of opacity produced by the fat globules.

"It is an instrument which I have never tried, and which, indeed, does not promise much.

The only really safe and satisfactory manner of examining milk is by means of an analysis of it. This used to be considered a long and tedious, and little satisfactory operation. By the aid of a few simple devices, milk analysis may be very much simplified."

To show the difference of opinion in regard to the instruments used for the testing of milk, I may be allowed to quote a few extracts from the Annual Report of the Butter and Cheese Exchange of New York, and the American Dairyman's Association for 1874.

"TESTING MILK.

"Mr. S. A. Farrington, of Cattaraugus, delivered a very interesting practical address upon testing milk with the lactometer. The address was illustrated by the presentation of the instruments to view, and was in part an explanation of those instruments. It is impossible for us to reproduce this illustrated effort.

"Suffice it to say that Mr. Farrington expressed, and gave good reasons for a trust to the lactometer tests, if they are used under favorable conditions, and intelligently. The lecture was heard with marked attention.

"The following is Mr. Farrington's address: —

"*Mr. President, and Members of the Association:* —

"I think I am entirely safe in saying that in the management of our factories there is no one thing so much neglected, and so little thought of, as that of 'Testing Milk.' not only as to its natural relative value, but whether or not it has been adulterated or diluted.

"I shall not at this time describe the different methods that may be adopted, to determine the value or purity of milk, but will only refer to the lactometer, or the lactometer and cream-gauge.

"Throughout the entire length and breadth of the dairy section of this country, the opinion almost universally prevails, that there is 'no instrument whereby adulterated or diluted milk can be detected.' And not a few factory patrons think the lactometer is a humbug, kept by cheese and butter manufacturers for the purpose of making them believe that it is possessed of some magic or other undefinable power, by which they are enabled to determine the quality of milk, thereby endeavoring to take advantage of the credulity of the ignorant.

"Others think that if there is any real virtue in the lactometer, it is so complex and intricate, and requires so much experience and skill in handling, that only the scientific man is competent to use it, and hence is of no practical value in our factories.

"Now, both of these positions are entirely erroneous, as there is, or can be, nothing more simple. As was remarked by the eminent counsel, Judge Earl, at the celebrated milk suit tried at Herkimer, N. Y., in the spring of 1867, 'God has revealed himself to man in two ways, by nature and by revelation, and one is just as true and undeniable as the other.' Now, the law of gravitation (by which law the lactometer is solely and entirely governed) can no more be changed than any other law of nature.

"The lactometer or hydrometer (as they are the same in principle) is used simply to ascertain the specific gravity of liquids, water being taken as the standard. Upon the same principle that the hydrometer determines the 'proof' of liquors, and the saccharometer the amount of sugar in grape juice (or any other saccharine liquids), does the lactometer detect the presence of water in milk. As is well understood, a cubic foot of distilled water (or rain water), at a certain temperature, weighs 1,000 ounces, and a cubic foot of pure milk at the same temperature weighs 1,032 ounces. Having ascertained that the lactometer, when immersed in water will settle at a certain point, that point will always be the same in pure water, at the same temperature.

"Now, if it is immersed in a liquid of a greater specific gravity (like that of milk), at the same temperature, of course it will not sink so far. And the difference between the two extremes will be the difference between water and milk; and hence I assert, without fear of successful contradiction, that having ascertained the point at which the lactometer will stand in pure milk, it will always (or substantially so) stand at the same point when immersed in milk at the same temperature that the instrument is regulated at, if the milk hasn't been tampered with.

"It should be borne in mind that the samples of milk being tested are all pure and from healthy cows, from the same locality and at the same time, and produced from substantially the same food. It may be thought that I have interposed so many conditions, that the use of the lactometer is virtually destroyed for all practical purposes; but not so, as I will endeavor to show. And for that purpose let me give the experience of Dr. Fleischman. He personally inspected the milk of thirteen different dairies, in the vicinity of Linden, Germany, containing, in the aggregate, 123 cows. He noted the specific gravity of the milk of each cow sepa-

rately, and upon each day, in bulks, with the following results: —

"'The mean specific gravity from the whole 123 cows is 1.0316908.

"'The maximum specific gravity from any one of the 123 cows is 1.034300; and the minimum specific gravity from any one of the 123 cows is 1.029500. The milk of 9 per cent. of the cows exceeded 1.033 in specific gravity. The milk of 89 per cent. of the cows ranged from 1.033 to 1.030 in specific gravity, and the milk of 2 per cent. of the cows was below 1.030 in specific gravity. The mean specific gravity of the milk from the thirteen dairies ranged between 1.03065 and 1.03285, or, in round numbers, between 1.031 and 1.033. You will observe that this is a very slight variation.'

"After these experiments, says Dr. Fleischman, 'We incur no charge of rashness if we assert that no winter milk (obtained in sheds of at least 6 cows) shows a specific gravity below 1.030 or above 1.033, and, on the other hand, any such milk which exceeds these limits in either direction, is watered or both watered and skimmed.'

"Dr. Fleischman says further, 'When sufficient statistics have been collected as to the fluctuations in the specific gravity of milk yielded by certain breeds of cattle in certain districts, the indications of the lactometer afford very useful and trustworthy basis for judging of its quality. All recent observations tend, in common with our own practical experiments, to prove that the composition of milk is mainly dependent on the individuality of the cows, and on the breed to which they belong, and in a subordinate degree only on the quality of the food, provided, always, that this be sufficient for the animal's wants.'

"He says: 'The specific gravity of milk, having regard only to healthy beasts, kept exclusively for milking purposes, is by no means so subject to fluctuation as people were

inclined to believe. We often hear it asserted,' continues the doctor, 'that milk which is very rich in fat runs the risk of failing under the tests of the lactometer, because its larger proportion of fat lessens its specific gravity. This assumption is, generally speaking, a false one.

"'Our experience has not yet reached far enough to enable us positively to deny that a cow may somewhere be found whose milk shall be abnormally rich in butter-fat, and yet so, relatively speaking, poor in all other fixed constituents as to show a markedly low specific gravity.

"'But a case of this sort is certainly of greatest rarity, if, indeed, it ever occurs in a healthy beast. Much rather is it the rule with us that a milk very rich in fat is also rich in all other fixed constituents, and so still exhibits a high specific gravity.'

"These experiments of Dr. Fleischman give evidence of having been performed with great care and skill; and to my mind are very valuable to the dairy public, and especially as they agree so nearly with the experiments and observations of all of our most experienced factory-men who have given their attention to the matter. At the milk suit referred to there were several eminent writers and speakers on the dairy, and a large number of our most practical and experienced cheese manufacturers, called as witnesses with regard to the validity of the lactometer as a milk-testing instrument, and not one single factory-man testified against its validity; but, on the other hand, agreed in saying that they regarded it a perfectly reliable and sure detective in the hands of a careful operator; and the witnesses, both for and against the defendant, who had given any attention to the subject, testified that in their experience and observations in testing milk with the lactometer, they had never found milk, that they knew to be pure, from a whole dairy, to vary from that of any other dairy in the same neighborhood at the same time, more than $2\frac{1}{2}$ per cent.

"Observe how nearly this agrees with Dr. Fleischman's experiments.

"And right here let me refer to the fact that great pains have been taken to publish to the world that the lactometer is not and cannot be taken as a legal test; or, in other words, that a person accused of watering milk cannot be convicted in a court of justice upon the evidence of the lactometer, and that the verdict of the jury at Herkimer was in accordance therewith.

"The turning point with that jury in its verdict has been entirely overlooked or purposely withheld.

"The question was not (with the jury) whether the milk in question was watered or not (for I state what I know); not one of that jury, or Judge Foster, who presided, had a single doubt of its being watered; but the point was, who put in the water? and that the lactometer did not tell, — a very important feature in the case, as the law of this State requires that before a person can be convicted of watering milk it shall be proved that the accused 'either did it himself or knew of its being done.' Allow me to say further, that just a year from the time the first milk-suit was tried at Herkimer, there was another suit at the same place, before the same judge.

"No other evidence was produced against the accused except the lactometer, and that jury brought in a verdict of guilty.

"The only difference in the two cases was that in the last one, when the accused was away from home his milk came, 'all right,' which was evidence to the jury that he put in the water. Here is one case at least where the lactometer has been admitted as 'competent evidence,' in court, and where conviction was the result of its evidence solely; but this is not an isolated case of the kind.

"As in Switzerland, the tests of the lactometer, when properly conducted, are regarded as trustworthy, and so much so, that in Swiss law courts all disputed points as to the quality

of milk are settled by the evidence of the lactometer and cream gauge, and from them there is no appeal. The objection is often urged against admitting the lactometer as legal evidence, that 'the innocent may be caused to suffer.' As, for instance, a person may have a malicious and evil-disposed enemy, who, wishing to ruin his character, does it by watering his milk.

"The objection, with equal force, may be urged against all circumstantial evidence. But the lactometer has not to depend upon circumstances for its efficiency, as its virtue is based entirely upon a natural law and scientific principle. Another objection urged against the reliability of the lactometer is, that the milk of different cows varies so much that therefore it cannot be trustworthy. Now it seems to me that Dr. Fleischman (with the experience of every factory man who has paid any attention to the matter) has answered this objection very satisfactorily and conclusively, by saying, that milk from whole herds in the same vicinity, at the same time, don't vary materially.

"But for the sake of argument, we will suppose that a case may occur where one patron has a herd of cows that give milk exceedingly rich in butter, and of course the specific gravity will vary from that of the milk of other patrons, but be it remembered that the same variation will be shown by the lactometer all through the season; consequently, this objection falls to the ground. I do not presume to say that all milk that may be pronounced pure by the use of the lactometer is pure, by any means; for the reason that it may be watered, and the specific gravity restored by the addition of sugar, salt or chalk; but that is not a question to be decided by the lactometer. The question to be determined is simply this: when milk varies from its own standard, from time to time, from 8, 10, 15, and as is sometimes the case, 25 per cent., without any assignable cause, is it pure? We say no, common sense says no, and science says no. In case

milk has been both skimmed and watered, it may be very easily ascertained by using the cream gauge in connection with the lactometer. It has been for the purpose of awakening an interest and calling out discussion upon this matter, rather than expecting to impart any particular information, that I have taken up this subject, and if this shall be the result, my object will have been attained."

The subject was further discussed by Hon. HARRIS LEWIS, of Herkimer. The speaker illustrated the respective amount of water, butter, cheese and salts in a pound of milk, by different-sized cubes. We give some of the principal points of his witty and instructive address.

He expressed strong disapprobation against using the milk of sick cows. He also impressed upon the audience, by anecdote and illustration, the necessity of cleanliness in milking. He gave a series of experiments, showing the advisability of cooling and airing milk. The speaker agreed with Mr. Farrington in his praise of the accuracy of the lactometer. He claimed that no factory in his section had been run ten years without finding some black sheep among the patrons. When the lactometer shows a difference in a patron's milk, one of the two things is sure; either that milk is rich in cream, or it is watered. The way to detect the former is to compare it with some other milk, after the cream has risen on each. If the suspected milk shows the most cream, it is all right. If it does not show the most cream, then take a jar of the suspected milk and test it with the lactometer. Take a jar of milk that is all right, and test that. Then pour from a gauged jar enough water into the good milk to reduce its density to that of the suspected milk. The per cent. of water taken from the water jar will show to a dot the per cent. of water added to his milk by the dishonest patron.

Mr. H. FARRINGTON said that in an experiment made by Dr. Fleischman, the milk of 123 cows was found to vary only

5.1000. The speaker claimed that when milk showed a light density, therefore, it was a pretty sure sign that it had been watered.

Mr. SCHERMERHORN, of Herkimer, claimed that if salt was used to raise watered milk to its proper density, it might be detected by the taste. If chalk was used, it could be detected as a sediment.

Mr. HAWLEY. — The salinometer will detect any salt in milk.

A. L. FISH, of Herkimer. — I have long since abandoned the lactometer as a certain test, because the specific gravity of milk changes under certain circumstances. Again, the friction of the milk in going to the factory prevents the cream from rising in the proof glasses.

The density of the milk depends upon the food of the animal. Hence, starch will produce more caseine; carrots, more cream. Corn feeds upon gross material. In its early stages of growth, it is hurtful to cows. It contains a great deal of alkali, unfit to be eaten by cattle. The flowers of a plant contain the most starch. Hence fodder should be gathered in the flower, when food for cheese-making is required. The speaker pursued this line of argument to show that the density of milk could be regulated by feeding.

Mr. MOORE. — In my opinion the virtues of the lactometer are approximate.

In dry seasons the lactometer shows more water.

Mr. S. A. FARRINGTON. — I am sorry to hear a man of Mr. Fish's experience express a lack of confidence in the lactometer. I admit that circumstances will vary the density; but the variation is very slight. If one man's milk varies from the standard, his neighbor's will also vary the same. In order to detect milk that has been both skimmed and watered, we take a jar of pure milk and let the cream rise. Then we take the suspected milk, and let the cream

rise. We then skim both of them, and test with the lactometer, and it will tell the per cent. of added water.

Mr. BUTLER, of Herkimer. — I know a man who watered his milk and was detected by the lactometer, and punished for his dishonesty. And yet the next day he watered his milk, took it to the factory, and was asked, 'Why didn't you always bring such good milk?' (Laughter.) I think this shows that the lactometer is not a sure test.

Mr. SCHERMERHORN. — The manufacturers must know something about their business, and should not depend wholly upon the lactometer for information concerning cheese making.

Mr. H. C. GREENE. — I think the mistakes that have risen with reference to the lactometer are due to the ignorance of factory men.

Mr. CURTIS. — There is one source of poor milk not yet mentioned, and that is poor, half-fed cattle.

Mr. S. A. FARRINGTON. — I take the broad ground that no man has a right to be in a factory if he does not understand all of his business. (Applause.)

Mr. ARNOLD. — I was subpœnaed as an expert in a case tried in New Jersey. A man had been sued for watering his milk, when it appeared on evidence that the reason why his milk was less dense than that of his neighbors was because he lived nearest the factory and had delivered his warm milk. The fact is that factory men must use some judgment in using the lactometer.

ISAAC BURRELL, of St. Louis. — Allow me to add my testimony to the efficacy of the lactometer. I have no doubt that in factories any maker of common sense can detect watered milk with the lactometer. I find that a far more simple test is to take a drop of milk upon my thumbnail. If there is one particle of water in it, the drop will roll off my thumb; otherwise, it will not.

The following statements are communicated to the Inspec-

tor by Mr. John M. Merrick, the chemist, who has made analyses of milk for this office for two years past: —

"In making analysis of milk it is well enough to take the specific gravity of the milk, which should be done at a fixed temperature, with the aid of a specific gravity bottle and a delicate balance; but we must not pin our faith upon the indications of the lactometer. When a city inspector of milk is on his rounds it is very well for him to have a lactometer and a jar to test samples with, for of course any very flagrant adulteration will be at once detected, and the indications of the lactometer will also serve as a guide to the inspector, in a rough way, whether an analysis is advisable or not. But an *analysis* should be made before condemning a sample of milk.

"Mr. Wanklyn's arguments are *unanswerable*. Strippings with 18.74 per cent. of solids would be condemned as adulterated by the lactometer test.

"In a paper read before the Royal Dublin Society, January 18, 1875, by C. A. Cameron, M.D., the author says: 'The results of several thousands of analyses of cows' milk lead him to conclude that the mixed milk of town cows never contains less than 12 per cent., and that of country cows 11.5 per cent., of solids.

"'Forty analyses of pure milk from Dublin dairy cows gave 13 per cent. of solids containing 8.1 per cent. of caseine and fat.

"'In many cases of conviction in the Dublin courts for selling adulterated milk, although the alleged amount of added water was only 12 per cent., the accused never chose to have a duplicate sample re-examined.'

"It may be added to the above that the English Society of Public Analysists, after great deliberation and comparison of notes, have adopted the following, among other definitions of adulteration: 'An article shall be deemed to be adulter-

ated, etc. 3. If any important constituent has been wholly or in part abstracted or omitted, unless acknowledgment of such abstraction or omission be made at the time of sale.' And in the 'Limits' laid down by them they say, 'Milk shall contain not less than 9 per cent. by weight of *milk solids* not fat, and not less than 2.5 per cent. of butter fat.'

"We sometimes in Massachusetts have fixed samples of milk in which the *total* solids are 9 per cent., or thereabouts.

"In accordance with your request I send you a tabular statement of the results of the analyses of milk which we have made from samples furnished by you, April 1, 1874.

Analysis. Mark and No.	Specific Gravity.	Per cent. of cream.	Sugar, Salt and Ash.	Total Solids.	Water.	Per cent. of added water.
343	1.020	7 per cent.	3.93	9.54	90.46	25.20
344	1.026	6 "	4.70	9.74	90.26	32.80
345	1.025	7.50 "	4.01	10.23	89.77	17.00
346	1.027	7 "	2.67	8.48	91.52	22.54
347	1.026	7 "	4.53	10.53	89.47	20.00
348	1.023	5.50 "	5.85	10.35	89.65	40.00
349	1.022	7 "	3.85	9.10	90.90	30.00
350	1.025	5 "	4.32	9.86	90.14	26.40
351	1.027	6 "	4.93	10.76	89.24	22.77
352	1.026	5 "	4.61	11.14	88.86	12.94
353	1.020	5.60 "	5.67	10.70	89.30	33.00
354	1.025	5 "	4.03	9.09	90.91	32.54
355	1.022	7 "	4.46	10.19	89.81	23.60
356	1.022	6.50 "	3.79	9.37	90.63	25.60
357	1.025	4 "	3.71	10.50	89.50	9.50
358	1.030	5.50 "	3.87	11.07	88.93	4.00
359	1.024	6.50 "	3.20	10.20	89.80	7.00
360	1.027	11 "	2.74	10.74	89.26	00.00
361	1.027	7 "	4.01	11.41	88.59	1.34
362	1.030	6 "	2.60	9.60	90.40	6.70
363	1.024	10 "	3.73	10.33	89.67	12.00
364	1.023	4 "	2.25	7.32	92.68	32.40
365	1.029	13 "	5.42	12.28	87.72	8.40
Average . . .						19.38

" Very truly your ob't serv't,

" JOHN M. MERRICK,

" *Consulting Chemist.*"

During the past sixteen years I have used the lactometer to assist in the examination of more than thirty thousand different samples of milk, from cows of various breeds, and with great variety in the kind of food and general manner of keeping them.

Whatever assistance the lactometer may be in the examination of a sample of milk, it will only approximate to the amount of added water, which may change the specific gravity of the milk. I say, added water, because all, or nearly all, of our adulteration amounts to nothing more or less than extending the milk with water. It is true, however, that many of our dealers in milk (especially in the city) dilute their milk with water colored with caramel, perhaps a grain or two in a pint. This is not deleterious, any more than molasses, but still an experienced eye will detect it at once, and by its presence we are led to suspect that the sample is more or less extended by water.

In all of my examinations of milk, I carefully observe the color, after placing the sample in a crystal glass tube which holds about one half pint.

I then taste the milk, to ascertain if the sample contains a large or small amount of cream; and by the lactometer the specific gravity of the sample is determined.

If I find the milk rich in cream, it readily accounts for its low specific gravity; if, on the other hand, the sample is poor and thin, I see at once that the specific gravity is reduced by the amount of added water. The lactometer, for testing milk, amounts to but little, except in the hands of persons of experience in its use, and even then it is only advisatory whether to have the sample analyzed by the chemist or not.

I may here observe that in the enactment of the laws in this State in regard to the sale and conviction of venders of adulterated milk, the only evidence as to its adulteration admissable in our courts is a chemical analysis of the milk, with a sworn certificate by the analyst.

CHEMICAL ANALYSES OF MILK DURING THE YEAR 1860 AND 1861.

Analysis No. and Mark.	Amount of Adulteration — added water.
No. 26	24.66
" 27	40.00
" 28	31.40
" 29	48.84
" 30	36.63
" 31	33.73
" 32	44.77
" 33	22.10
" 34	29.07
" 35	33.73
" 36	22.10
" 37	33.73
" 38	32.05
" 39	12.91
" 40	24.42
" 41	32.56
" 42	27.91
" 43	40.70
" 44	32.56
" 45	25.59
" 46	43.03
" 47	24.42
" 48	69.77
Average amount of adulteration	33.33

CHEMICAL ANALYSES OF MILK DURING THE YEAR 1874 AND 1875.

Analysis No. and Mark.	Amount of Adulteration — added water.
No. 343	25.20
" 344	32.80
" 345	17.00
" 346	22.54
" 347	20.00
" 348	40.00
" 349	30.00
" 350	26.40
" 351	22.77
" 352	12.94
" 353	33.00
" 354	32.54
" 355	23.60
" 356	25.60
" 357	9.50
" 358	4.00
" 359	7.00
" 360	00.00
" 361	1.34
" 362	6.70
" 363	12.00
" 364	32.40
" 365	8.40
Average amount of adulteration	19.38

In closing this report, your Inspector would acknowledge the hearty co-operation of the commissioners, superintendent and officers of the Health Department, and also the kind assistance rendered by the officers of the courts.

I feel obliged especially to mention the valuable services of Messrs. Merrick and Gray, the city chemists, for their prompt and careful attention to the analyses of milk; and for the personal kindness and courtesy that have marked the intercourse of the year. My thanks are also due the Police Department, and especially to those connected with the Brighton and West Roxbury Districts, for their promptness in affording information, and their ready assistance in carrying out the object and intent of this office.

Respectfully submitted,

HENRY FAXON,

Inspector.

No. 30 Pemberton Square,
Boston, March 31, 1875.



CITY OF BOSTON.

City Document No. 37.

SEVENTEENTH ANNUAL REPORT OF THE INSPECTOR OF MILK, 1876.

To his Honor the Mayor and the Board of Aldermen of the City of Boston: —

GENTLEMEN, — Your Inspector respectfully submits the annual report of his office for the year ending March 31st, 1876.

The year just closed has been quite free from drought and other causes which in past years have had a tendency to lessen our supply of milk, and, consequently, to increase its adulteration.

No great changes have taken place in the milk business during the year.

It has been my earnest desire to keep the subject of adulterated milk constantly before the people, so that they might be enabled, if necessary, to avail themselves of the assistance and protection which the law provides.

The whole subject of milk — its inspection and adulteration, and the detection and conviction of offenders — has been so particularly laid before the public in many of my former reports that a repetition seems unnecessary.

During the past year I have examined nearly, or quite, two thousand samples of milk, sixteen hundred of which were in stores and shops, and the remainder in private families, at the milk depots, and the office.

The laws of this Commonwealth require that all inspectors of milk shall keep an office and books for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits.

The Inspector is also required to prosecute before the proper tribunal all such violations of the law as shall come to his knowledge, and to keep proper books of account and record of all matters pertaining to the office.

It has been my constant endeavor that the provisions of this law should be strictly complied with.

By the annexation to Boston of the territories of West Roxbury, Brighton and Charlestown, the milk business has so increased in magnitude that, for convenience, and to systematize the matter, separate sets of books are kept at this office for the two branches into which the business has been divided. These branches are as follows: —

1st. *Wholesale dealers*, who distribute milk to families, stores, etc., from carriages, or who keep more than one cow, in the several sections of the city.

2d. *Retail dealers*, who sell in small quantities from market places, stores, shops and cellars.

Number of cows kept within the limits of the city of Boston, 1,880, viz.: —

Number in the city proper	28
Number in the Dorchester district	600
Number in the Roxbury district	418
Number in South Boston	100
Number in East Boston	154
Number in the Charlestown district	23
Number in the Brighton district	162
Number in the West Roxbury district	295
	1,880

Number of persons who keep but one cow	515
There have been recorded the names and places of business of wholesale dealers in milk since last report	62
Whole number of wholesale dealers registered	1,644
Number of wholesale dealers now in the business	739
Number of wholesale dealers now selling from carriages	381
Number of small wholesale dealers who keep more than one cow and sell to the neighborhood	358
Number of retailers in milk recorded since last report	64
Whole number of retail dealers recorded to date	3,388
Number of samples of milk inspected since last report	1,925
Number not adulterated	1,547
Number more or less adulterated	378
Number of cases analyzed by chemist	26
Average amount of adulteration in the cases analyzed	17.25

Largest amount of adulteration (water intentionally added in 100 parts in the cases analyzed)	44.63
Least amount of adulteration (added water) in the cases analyzed	3.01
Number of samples analyzed, including above, and not adulterated	5
Whole number of samples of milk analyzed to date	391
Number of cases pending in the courts at the date of last report	2
Settled in the courts by paying cost	2
Number of complaints in the Municipal Court	1
Number convicted in the Municipal Court	1
Number of complaints to the Grand Jury	3
Number of bills of indictment by the Grand Jury	3
Number convicted in the Superior Court	3
Whole number of complaints in court to date	279
Whole number convicted to date	207
Whole number not convicted	72
Number of cases now pending in the courts	0
Number of gallons of daily supply of milk for the City of Boston	34,670
Estimated daily cost to consumers	$11,094 40
Number of gallons for supply one year	12,654,550
Estimated cost to consumers one year	$4,049,456 00

The expenses of this office have been as follows, viz. : —

For the analysis of milk	$240 00
Stationery, record books, advertising, printing, etc.	61 13
Inspectors, small bills for assistance, lactometers, and other instruments	28 75
	$329 88

For violations of the milk law there have been paid in the Municipal and Superior Courts fines and costs amounting to	$701 35
One half the fines have been paid to the complainants, viz. : —	$330 00

The time has come in which the citizens of many of our principal cities are awake to the importance of causing laws to be enacted and offices established for the keeping in check the evils of adulterated milk.

It is not only the consumers of milk that require protection, but also the honest producer, and all others engaged in the milk trade.

It is impossible for the honest dealer to compete with the dishonest ones who adulterate their milk to an unlimited extent.

During the years 1858 and 1859 the Legislature of this State realized the importance of enacting laws in relation to the sale and inspection of milk; and the City of Boston has ever been ready and willing to assist in the execution of all laws and enactments for the protection and the health of her citizens.

The early establishment of this office; the chemical analysis of nearly four hundred samples of milk; with complaints in court to the number of three hundred; and the inspection of thirty-three thousand samples, — have given this office an experience and knowledge not acquired by any similar office in this or any other country.

In fact, it appears, from reports and documents received from some of the principal cities of Europe, that until recently but little effort has been made towards the detection and conviction of venders of adulterated milk.

For general information on the subject of milk and its adulteration, I may be allowed to incorporate in this report the existing laws of the State, and such matters as may be of interest to the governments of other cities and towns, who are frequently seeking information from this office.

Extracts from Acts in relation to the Sale and Inspection of Milk.

Be it enacted, etc., as follows: —

Section 1. The Mayor and Aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be Inspectors of Milk, for their respective places, who shall, before entering upon the duties of their office, be sworn. Each inspector shall give notice of his appointment by publishing the same two weeks in a newspaper published in his city or town; or, if no newspaper is published therein, by posting up such notice in two or more public places in such city or town.

Sect. 2. The inspectors shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits.

They may enter any place where milk is stored or kept for

sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof, and cause the same to be analyzed, or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admissible in evidence in all prosecutions under this act.

The inspector shall receive such compensation as the Mayor and Aldermen or Selectmen shall determine.

Sect. 3. [Repealed by Acts of 1867.]

Sect. 4. Whoever neglects to cause his name and place of business to be recorded in the inspector's book, and his name legibly placed upon all carriages used by him in the conveyance of milk, before engaging in the sale thereof, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence fifty dollars.

And whoever offers for sale milk produced from cows fed upon refuse of distilleries, or any substance deleterious to the quality of the milk, or whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first, and fifty dollars for every subsequent offence.

And whoever, in the employment of another, knowingly violates any provision of this section, shall be held equally guilty with the principal, and suffer the same penalty.

Sect. 5. It shall be the duty of the inspector to cause the name and place of business of all persons convicted under the preceding section to be published in two newspapers printed in the town or county where the offence may have been committed.

Sect. 6. All acts and parts of acts inconsistent herewith are hereby repealed.

[Approved March 30, 1864.]

Inspection of Milk.

(Chapter 319.)

An Act to prevent the sale or exchange of adulterated milk.

Be it enacted, etc., as follows: —

Section 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or

any foreign substance has been added, shall for the first offence be punished by a fine, not less than twenty nor more than one hundred dollars. And for any subsequent offence, by a fine of not less than fifty nor more than three hundred dollars.

Sect. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalties provided in the preceding section.

Sect. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty, nor more than three hundred dollars, and, for any subsequent offence, by a fine not less than one hundred dollars, and imprisonment in the House of Correction not less than thirty nor more than ninety days.

Sect. 4. Violations of this act may be prosecuted by complaint or indictment before any Court of competent jurisdiction, and one-half of any fine paid shall go to the complainant.

Sect. 5. All acts and parts of acts inconsistent herewith are hereby repealed; but such repeal shall not affect any prosecutions now pending.

Sect. 6. This act shall take effect upon its passage.

[Approved May 4, 1872.]

The following information, being useful from year to year, is inserted from my last report: —

The contracts for the supply of milk are generally made twice a year, viz.: on the first of April and the first of October.

The milk-cans used for the conveyance and sale of milk by the dealers are of two classes. The large cans, which hold nine quarts and a pint, are in general use by the milk-trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans, which hold eight quarts and one-half pint, are mostly in use on the Fitchburg, Lowell and Eastern Railroads; and no milkman is considered equipped for business unless he is the owner of four or five full sets of cans, either *eights* or *nines*, as above described, sufficient to contain the milk necessary for his daily route; one set being in use while the others are on their way to the country for a fresh supply.

Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers.

These cans are left within the houses, or at some designated place on the premises.

This arrangement for supplying families with milk cannot be too highly recommended.

These small cans are, or should be, filled in the afternoon previous to their delivery the next morning, — thus affording sufficient cream for the family coffee.

Those who have their milk measured out from the large cans often receive their portion from near the bottom of the can, and thereby get considerable more than their share of *skimmed-milk*, if nothing less desirable.

There are but few of the milkmen who are not hard pressed for time in the morning; consequently they do not stop to turn their milk from can to can, as they should do, in order to mix it thoroughly and make it throughout of a uniform quality.

The price of milk has varied but little in the last two or three years, viz.: at the farmer's door, from thirty-three to forty-two cents per can, and at the depots in or near the city, after collection and transportation, from forty to forty-eight cents. This is sold by the milkmen to stores, shops and eating-houses, etc., at from fifty-four to sixty-two cents per can, and is retailed in smaller quantities to families, at eight cents per quart.

Although the above prices are such as are generally agreed upon, yet many of the milk-dealers, owing to the great competition in the trade, would buy and sell their milk at greatly reduced prices, — governed only by supply and demand.

It is well known to persons interested in the milk business that a few years since an association was formed under the name of the Massachusetts and New Hampshire Milk Producers' Association.

In this connection, and as relating to the price of milk and its transportation, a few extracts taken from the "Boston Cultivator," of January 1, 1876, may be of interest. The writer says: —

"What good has this Association done?

First. It has given milk-producers an opportunity to have a voice in making the price of milk, which they did not enjoy before the organization of this Association. The directors of the Milk Producers' Association and the directors of the

Milk Contractors' Association meet and confer together twice a year, fall and spring, and make the price for the coming six months; and thus producers have got better prices for their milk while consumers have paid no more. This has been especially demonstrated the past two years.

In the second place, a better law, and a more efficient execution thereof, have been secured against the adulteration of milk sold by the trade to consumers.

The more water there is peddled from milk-cans in Boston, the less milk there will be required from the farms to supply the milk-trade in Boston and suburbs. Hence it is manifest that the Association has thus been instrumental in increasing the demand for milk by diminishing the sale of *extended* milk.

In the third place, the petition of the Milk Producers' Association to be heard before the Board of Railroad Commissioners, relative to having provided better facilities for transporting milk to Boston, from the farms along the line of the Fitchburg Railroad, than had been hitherto enjoyed, which hearing resulted in ultimately securing what was demanded. At that hearing Capt. John B. Moore, of Concord, Mass., said he could get fifty cents a can for milk in Boston, if he could get proper facilities for transportation; but, as it could not be had, he abandoned the business."

Last spring, after the farmers had engaged their milk to the contractors for the season, the Superintendent of the Fitchburg R. R. issued the following special notice: —

"On and after April 1st, 1875, and until further notice, the Fitchburg Railroad Co. will receive at all stations where milk is now received, milk in 8-quart cans, properly tagged and directed for transportation in its milk trains, to its milk tracks at Charlestown station in Boston, at the following rates, viz.: from stations between Concord and Waltham, inclusive, four cents per can; from all other stations, five cents per can. An additional charge of ice per can will be made when milk is iced. Tickets in packages of one-hundred each for transporting milk, with or without iceing, can be procured at General Freight Agent's office in Boston. The station agents at the several stations will receive the cans at a convenient place for loading them into the milk car, (proper tickets to be given up with each can), and the same will be delivered from all the milk cars to the consignee to whom they are directed. Return cans will be subject to no charge.

All milk not called for at milk track will be returned.

C. L. HEYWOOD.

Boston, March 18th, 1875."

The above notice indicated to milk-producers along the Fitchburg Railroad, that every producer could, if he desired, send his milk to whomsoever it was consigned to in Boston. A farmer in Stow told us, last winter, that he could sell his milk for fifty cents a can, provided the Fitchburg Railroad Co. would carry it, just as they have now provided to do. Let milk-producers avail themselves of the opportunity obtained for them. This is what the Massachusetts and New Hampshire Milk Producers' Association long and earnestly contended for, and which, after much delay, was gained, as announced above, by the Railroad Corporation; for which let milk-producers be thankful and take courage.

The Price of Milk Considered.

September 13th, 1875. — The committee appointed by the Milk Producers' Association to meet the contractors, in case there should be a disagreement as to the price to be paid for milk the coming winter, met in this city, on the 13th inst., having been notified of a reduction of one cent per can. After a hearing of all the reasons assigned for said reduction the committee unanimously agreed that no good and justifiable reasons had been given, and that the proposition to take one cent per can from the farmer, and give it to the retailer, was one that ought not to be submitted to without remonstrance. In consideration of the general stagnation of business, and the large number of laboring people out of work, the committee felt justified in not asking an advance; and if the proposed reduction had been for the benefit of the consumer they would have considered the demand as having some show of reason. They deem it better to get a fair price for what they do sell, than to sell at less than cost on account of an overstocked market.

The report closes as follows: —

"No satisfactory price can be obtained so long as the production is greater than the want of the market."

April, 1875. — The first part of this month the weather was variable and generally moderate up to the 8th day, which afforded rain, hail and snow. This month was mostly devoted by your Inspector to the inspection of the milk in stores and shops at the Boston Highlands.

The general supply of milk more than equalled the demand, so that but little adulteration was found in the stores. The middle of the month, with few exceptions, was cold and stormy; the 19th, 20th and 21st days were very cold and blustering. The month closed, however, with moderately

pleasant weather and an abundant supply of milk. During this month some early morning calls were made to the section above named, and samples of milk were taken from some of the milkmen, as they were delivering milk to their customers; in all of which cases, with one or two exceptions, the milk was found to be good family milk.

May, 1875 — afforded twelve days that were quite pleasant, and ten which were dull and lowery, and eight days of variable weather attended with rain; but no long storms, as is usual at this season.

The supply of milk from the country and from the depots was fully equal to all demands. By inspection in the stores and shops at the northern and western portions of the city the milk proved unusually free from adulteration.

June, 1875. — The weather the first few days of this month was very cool for the season; the 6th day, however, very warm and pleasant, followed by moderate weather, and frequent rains; a number of days were dull and lowery, with an occasional pleasant day. This variable weather continued to the middle of the month.

The 17th of June being the grand Centennial celebration of the battle of Bunker's Hill, a warm welcome was extended to the people of every State in the Union to come and receive the courtesies of the City of Boston.

It was evident to all our dealers in milk that our supply from the country must be largely increased, in order to meet the wants of our immense population.

For this extra quantity previous arrangements were made with the milk-producers and the railroads.

During the whole night of the 16th the milkmen were employed in delivering their milk to customers.

The 17th, the great day in which so many thousands were deeply interested, the weather was very cool and pleasant, with a refreshing east wind, which much conduced to the pleasure and comfort of the vast concourse of people.

The milk-dealers, however, were sadly disappointed by the cool weather, which seriously lessened the demand for their increased supply of milk.

On the morning of the 18th the inspector was "prospecting" around amongst the milkmen, whose feelings appeared to be in perfect harmony with the weather, which was dull, cold and stormy. The milk carriages contained more or less of milk which was left on the night of the 16th, and was now being returned as old milk, unfit for use, excepting for the manufacture of butter and cheese.

The weather to the close of the month, with few exceptions, was warm and pleasant. This month was devoted to the inspection of the milk in the stores and shops, and in some private families of the Charlestown district.

A number of samples were taken from the milkmen, which were analyzed by the city chemist; but none were found sufficiently adulterated to justify a complaint in court.

The supply of milk during the month was fully equal to the wants of all the customers.

July, 1875. — Throughout this month the weather was warm, with a few days which were dull and lowery, and with sufficient rain to keep vegetation in good growing condition. There was not an uncomfortably hot day during the month. Dry, hot weather seriously affects the supply of milk as well as the demand; and often the quality is materially affected by the sudden changes of the weather.

As is usual at this season, many families left the city for their summer resorts in the country, which considerably reduced the demand for milk.

With the exception of three or four days during the month, the milk-dealers obtained a supply sufficient to meet the demand.

Notwithstanding our ample supply of milk, some three or four of our milk-and-water dealers were again (in some of those early morning calls) detected in vending their "extended" milk.

A number of their associates the fall previous had been dealt with so tenderly that in the present case but little alarm was manifested, and of their own accord they were willing to appear in court and plead guilty.

When the district attorney and the court learned that these parties had been there three or four times before, for the same offence, they were not disposed to take a very lenient view of the matter, and accordingly sentenced each to pay a fine of three hundred dollars and costs. One of these parties was not disposed to submit to this fine, and he remained in jail a number of days, until released by friends, who paid his fine and costs.

Many of our honest milkmen, as well as the citizens generally, felt satisfied that justice had been done to this class of offenders; and the inspector is satisfied that the amount of adulteration to the close of the season was materially lessened thereby.

The stores and shops in the central part of the city were visited this month, and the milk examined.

A few samples were taken, which, on analysis, showed but little adulteration.

August, 1875. — The first thirteen days of this month the weather was variable, with frequent showers, and a number of warm, pleasant days, — fine weather for a sufficient supply of milk, which continued until Saturday, the 14th, when the weather became very hot and sultry, which so reduced the supply that many of the dealers could not obtain the amount required for their customers.

This sudden diminution in the supply of milk, and the increased demand — caused by the hot weather — showed itself plainly in the stores and shops by an increased amount of adulteration.

This limited supply of milk continued to Monday, the 23d, when the weather again changed, and became cool and pleasant, bringing forward once more plenty of milk, which again reduced the adulteration, so that the improvement was plainly visible in all parts of the city.

The cool, pleasant weather continued, with few exceptions, to the close of the month, with milk enough, and some to spare to the butter and cheese factories.

All the places where milk is kept for sale at the south part of the city were visited by the inspector; a few samples of milk were taken for analysis, none of which, however, would justify a complaint in court.

September, 1875. — The general inspection of the milk this month was at East Boston, and but little adulteration was found in the milk in the stores and shops.

A number of times in the course of the month samples of milk were taken from the dealers between the hours of four and six o'clock in the morning, some of which were analyzed and but small adulteration found.

The weather throughout the month was favorable to a good supply of milk, which was about equal to the demand.

The milk depot in East Boston was visited frequently, and a large number of cows were examined, and the milk, with few exceptions, was found good.

This depot is daily supplied with about 300 cans of milk, which is all, or nearly all, distributed to the citizens of this ward.

This section of the city is also visited by the milk-dealers from Charlestown, Somerville, and other places in the neighborhood, and the milk supplied there will compare favorably with the milk furnished other parts of the city.

October, 1875. — Generally, in the first of this month, the winter contracts and the advance price of milk commence; but, this year, so far as the milkmen and their customers were concerned, the most of them adopted the last summer and the previous winter prices, while a few sold their milk at a small advance on what they received last summer; but nearly all the retail trade to families was for eight cents a quart.

The weather throughout the month was favorable for a good supply of milk, and the season had so far advanced as to quiet all fears respecting any scarcity.

The whole of this month was devoted to the examination of the milk in South Boston, where nearly every grocer, provision-dealer, and bread store sells more or less of milk.

It has always been considered that the citizens of this section were more particular respecting the quality of the milk supplied them than were the citizens in many of the other wards, and would patronize only those places where good milk could be obtained.

November and December. — From the most reliable information that could be obtained, it appeared that the supply of milk during these two months was sufficient to meet the demand.

The milk-trade with all the dealers was considered very dull, if we except a few days at the anniversary of Thanksgiving, and of Christmas; yet the supply appeared sufficient, and the samples of milk taken from the dealers proved to be good.

The general depression of business during the year has affected the dealers in milk equally with other classes, and not a few of them have lost their milk-routes in consequence of not being able to collect money enough from their customers to pay the producer or the contractor for their milk.

The districts of Dorchester, Brighton, and West Roxbury were visited many times in these two months, and the milk in stores and shops was examined.

In *January*, *February* and *March* there is but little demand for an extra quantity of milk, and the open moderate weather this winter has been favorable for an ample supply.

We have now nine or ten railroad milk-stations, which supply us with a large proportion of our milk, all of which

are located within the limits of the city, with the exception of those at East Cambridge.

These places have often been visited during the year; and it is worthy of remark that we find, by the returns of the City Chemist, a large amount of adulteration in the samples of milk taken by the Inspector direct from the cars. But the duties of this office do not and cannot, under the law, reach directly the farmer, or the *producer*.

We but too often find that dishonest practices in regard to our milk commence at the cow stables, and end only at the table of the consumer.

Some of our milkmen in supplying their family trade distribute to a favored class of customers the *upper half* of two cans of milk, while to those none the less deserving is given their portion from the two remnants; thus, one family receives an extra large proportion of cream, while another is deprived of it entirely. Not a little of our milk thus robbed of its cream finds its way into our retail stores and shops, and is dealt out in small quantities to the poorer class of our citizens.

Another growing evil in the milk-trade is practised by many of our grocers and shop-keepers, and even extends to some of the eating-houses, who will discharge their honest milkman, that is supplying them with good milk at a fair price, and for a bonus of from fifty to one hundred and fifty dollars sell their trade to some unprincipled milkman.

For a short time quite a good article of milk is received, but its character is soon changed, and his trade is found daily becoming less; the former customers supply themselves with milk elsewhere, and at the same time and place obtain other articles necessary for family use.

The seller now begins to realize the result of having sold *himself* for a trifle, and finds there is no way of escape but to refund the money or violate the contract, and submit to a prosecution. More than one retailer of milk in this city has been nearly ruined in his business by selling himself to one of these fellows, who are always prowling about in search of those whom they can rob and cheat.

The following extracts, taken from documents published in other parts of our country, and forwarded to this office, in regard to the sale of adulterated milk, and the conviction and punishment of offenders, may be of interest to all persons, dealers as well as consumers.

It may also be of interest to give the various opinions of scientific men in regard to the use of the lactometer and other instruments used for the detection of adulterated milk.

[*From the New York Tribune.*]

"ADULTERATIONS IN MILK.

At the Court of Special Sessions in this city, on Wednesday, there were twenty-six cases on the calendar, all the offenders being charged with the selling of adulterated milk. Justices Bixby, Wendell, and Duffy presided.

Col. W. P. Prentiss and Col. George Hastings, counsel to the Board of Health, conducted the prosecution.

The first case called was that of Louis Schneider, who elected to be tried by jury and gave bonds to appear.

The next called was Francis McCarron; but the officer failing to identify him as the proprietor of the place where the milk was sold, he was discharged.

Frederick Lubbin and John Hoare pleaded guilty. Francis B. Lawrence read their affidavits, that the milk had not been adulterated by them, and it was sold by them just as they received it.

They had procured it indirectly from a man in Jersey City, who had since been proceeded against by the officials of that city. On these affidavits the counsel asked that a nominal punishment be inflicted. They were fined $50 each, which they paid, and were discharged.

John Juerhter, of No. 98 Mott street, was then called. Officer Gardner, an inspector of milk, testified that he had visited farms in Orange and Westchester counties, and had examined the milk of over 100 cows with the lactometer, and in no case did he find it to register less then 102, the highest being 120, the temperature being 60. The standard of pure milk as fixed by the Board of Health is 100. The milk sold by the defendant was found to register 88. Prof. Charles F. Chandler, President of the Board of Health, testified that he had made the examination of milk a special study, and had concluded that the lactometer was the most practicable test for the adulteration of milk with water, but was not a trustworthy test for other adulterations. It simply tests the specific gravity. The hydrometer took water as the standard. Water would register 1.000. Pure milk would vary from 1.035 to 1.029½. Of the milk of 195 cows examined with the hydrometer, the minimum was 1.029½. The Board of Health took the minimum of the hydrometer as the standard, placed on the scale of the lactometer at a point corresponding to the 1.029 of the hydrometer's 100, and made that the standard of the lactometer. The instrument in common use by milkmen differed from this in that it took the standard of the hydrometer at 1.033; therefore a sample

of milk which registered 100 by the lactometer of the Board of Health would register only 88 by that in use by the milkmen.

Dr. Henry Morton, President of the Stevens Institute of Technology, testified that 1.029 was a correct standard of milk by hydrometer, and a lactometer of that standard would give the correct specific gravity of milk. If a sample of milk only registered 88 by a lactometer of this standard, it was not pure milk.

Prof. George F. Barker, of the University of Pennsylvania, testified that the lactometer was a good test for the specific gravity of milk. Chemical analysis was the best way to test the purity of milk.

Milk registering 88 in the lactometer of the Board of Health was not pure milk.

Prof. George C. Caldwell, and Dr. Endeman, chemist of the Board of Health, corroborated testimony of the previous witnesses.

Prof. Elwyn Waller, assistant in analytical chemistry at the School of Mines, Columbia College, testified that he made a chemical analysis of a sample of milk alleged to have been adulterated; in this case the analysis clearly showed that water had been added.

The defendant testified that he did not adulterate the milk, and did not know it was adulterated until the inspector told him; he immediately stopped the sale; he had sold it just as it was received.

The sentence of the court was, that he pay a fine of $100, which he did, and was discharged.

Nine other dealers then pleaded guilty, and were fined each $50, which they paid, and were discharged.

WATERED MILK.

A service of great value has been performed by the Board of Health, in improving the character of the milk sold in this city. The work was begun last fall, and has been carried on ever since, in spite of much opposition and discouragement. A section of the sanitary code gives the requisite authority, by providing that at places where milk, butter, and cheese are offered for sale, those articles shall not be in an unwholesome condition; and milk from cows kept in stables, or adulterated with water, is specified among the articles which it is an offence to have on sale.

Among the excellent work done by Gov. Tilden in checking the pernicious legislation of the last session was his

veto of a bill which was intended to destroy the force of the present restrictions on the sale of adulterated milk.

Two courses were open to the Board of Health in carrying out the law: to have a series of very expensive analyses made of the milk offered for sale throughout the city, or to have the milk approximately tested by means of a simple little instrument, costing a dollar, known as a lactometer. The Board wisely adopted the latter alternative.

About 40 per cent. of the milk supply of the city comes by the Erie Railway; more than a quarter by the New Haven road; an eighth by the Harlem; a tenth each by the Hudson river and the New Jersey Midland.

The farmers on these roads were glad to have their milk tested. The watering is rarely done at the farm. Just where it is done is, of course, one of the most difficult things to ascertain. If, for instance, it is performed on the ferry-boat, crossing the Hudson in the dim gray of the morning, the cans which hold water that is to be added have that water colored with enough milk to conceal the fraud at the time. But after the adulterated fluid has reached the stores and minor depots from which it is retailed, its condition is easily detected by means of the lactometer. The scale of this instrument runs from zero to 120; if plunged in pure water it sinks to zero; if put in first-rate milk at a temperature of 60, it rises to 120; if such milk is mixed in equal parts with water, the lactometer floats at the half-way point, marking 60. In a long series of trials on the farms where New York milk is produced, the officials of the Health Board rarely or never found a healthy cow, no matter how fed, whose milk when cooled to 60 marked less than 100 with the lactometer. Carefully made trials show a remarkable uniformity among great numbers of cows.

Of course the instrument only shows the density of the milk; if thickened with some foreign substance it might raise the lactometer to the standard height after watering; but the chemical examination of 300 samples of city milk has failed to indicate that chalk, or sheep's brains, or anything else but water, have been added.

When, therefore, the lactometer sank below 100 in the milk offered for sale at shops and stores in this city, notice was given to the proprietors that they were liable to arrest. In about 20 aggravated cases they were brought before magistrates and fined sums varying from $50 to $200. The whole city was districted, the shops and stores were visited, and their milk tested. Very curious results were obtained. In some of the poorest quarters of the city the milk was

by no means the worst. Perhaps a third of that in Baxter street was below the standard, two samples making only 76; but there was a longer list of watered milk in Second street, and one place where the lactometer stood at 50. The milk, being usually kept in an ice-chest, is generally found when for sale at the required temperature.

Many of the dealers have bought lactometers since this investigation began, and if they water their milk themselves, at least limit the dilution so as to keep it above the 100 mark.

The effects of these measures are at once perceptible upon revisiting the places where milk is sold, sufficient time having been given to the retail dealers to take the necessary steps for changing their supply if they had been cheated by their milkman.

The improvement when the tabulated records are put side by side, showing what was ascertained at each visit, may be briefly stated as indicating that at least 50 per cent. of the places where adulterated milk used to be sold now keep an article fairly up to the standard.

Great efforts have been made, however, in some recent cases brought into court to prove that the lactometer test was not to be trusted. Eminent scientific evidence was brought to bear upon this point, the theory being advanced that a difference of feeding might reduce unadulterated milk below the 100 standard, while watered milk might raise it above it.

Thus far the Board of Health has succeeded in the prosecutions, and the dealers have been fined, notwithstanding the talent brought to their defence. The public has a deep interest in the continuance and success of these sanitary measures, which have already provided New York with an average of much better milk than neighboring cities.

The lactometer would doubtless be of great service elsewhere than in shops and stores, to show the quality of the article supplied by the milkman.

The simple fact that out of every 25 infants that perish with bowel complaints, 19 are found to have been fed from a nursing-bottle, is a sufficient index of the relation that the quality of city milk bears to the health of families."

[*From the New York Tribune.*]

"THE LACTOMETER AND ITS LESSONS.

The lactometer shows the specific gravity of the milk with as much accuracy as the thermometer does the temperature of the air or the barometer its pressure; but it is not under all circumstances a trustworthy guide to the quality or

purity of milk; for though it will show accurately every variation in specific gravity, it will not indicate the cause of the variation. If a lactometer is regulated to sink to a certain point on its stem in water, and then placed in the mixed milk of a herd of grass-fed cows, it will throw more of the stem above the milk. Let us represent the point to which it sinks in water by W, and the point to which it sinks in pure milk, as above, by P, and let the portion of stem between W and P be divided into 100 parts, and let similar spaces also be marked on the stem below P. This is the way the stem of a lactometer is graduated. The number of parts into which the space between W and P is divided is arbitrary. It may be divided into 50, 80, 100, or 120 equal parts, or any number preferred. It would seem that the Board of Health have divided it into 120 parts. The zero point in all cases is placed at W. It is most convenient for general use to divide it into 100 equal parts, and the lactometer in use by dairymen is so divided. Now, if this instrument is placed in the milk of a herd of common grass-fed cows, the milk being at the temperature for which the lactometer is regulated, it will invariably sink to P, never varying more than a very few degrees above or below. If the milk of single cows or particular breeds be taken, greater differences will be shown; also, if the food used is unusually watery or unusually dry, it will cause the stem to sink or rise a little. The widest extremes I have ever seen or known in individual cows, including all the variations occasioned by individual peculiarities, breeds, and variations in feed, which have resulted from hundreds of experiments, have been 114 and 84. At each of these extremes but a single case has been found. The extremes for herds are 10 degrees less one way and 6 the other, being 104 and 90. In a herd of common grass-fed cows I have never known a greater variation than 2 either way, and rarely indeed will the milk of such cows, if the proper temperature is observed, vary at all, but will stand exactly at the point P.

Creamometer saves from unjust conviction.

Milk which has been fully skimmed will throw the stem up to 120. The variations in milk from which all the cream has been taken are very slight — so little that it may be assumed to have a uniform specific gravity.

When the stem rises above 105, a lack of cream may fairly be predicated by the lactometer. If to fully skimmed milk twenty per cent. of water is added, the stem will sink again to indicating pure milk. Skimming, therefore, can easily be practised without being detected by the lactometer, it being easy to balance the increased gravity occasioned by

skimming by adding water. But if milk is found heavier than the normal condition, a court may rightfully convict for the abstraction of cream; and if it is found too light, a conviction may rightfully be made for an excess of water.

There is one possible exception to this rule. Milk which contains more than the usual quantity of cream will have its gravity reduced, and the lactometer will sink in it the same as if it had been watered. But no innocent person need fear conviction in such a case, because a sample of such milk placed in a creamometer — a glass vessel with straight sides graduated — will show in a few hours whether the lactometer sinks from excess of cream or excess of water.

Men who sell milk with an excess of cream are not those whom purchasers are likely to complain of. Should such an extraordinary case ever occur, the creamometer would not fail to satisfy any court of the truth in the case. Such an instrument ought always to be used in connection with the lactometer to give significance to its indications, though the cream test is only approximately correct."

"A Milk Measure Wanted.

The limit set by the City Court for watered milk, as indicated in 'The Tribune,' is altogether too liberal on the side of the milkman. It fails to do the consumer justice.

The limit is clear outside of the widest known variation in milk when produced under the most unfavorable conditions for quality. If the milkmen should reduce all their milk to the limit adopted by the court, the consumers would get nothing but milk which is poorer than any ever known to be produced by an apparently healthy cow. This system does not give sufficient protection to the consumer.

If the variable limit for sound milk established by the court were reduced one half, it would still give the milkman an advantage over the consumer, for it would not compel him to meet the consumer half way between the widest known variations and average sound milk, because the limit is outside of known variations.

A court may rightfully convict any person for selling milk in which the lactometer sinks too low, if the creamometer used in connection with the lactometer shows that no excess of cream accompanies the depression; for if water in excess of what is a fair average has been introduced into milk indirectly by feeding distillery slops, brewers' grains, or other watery food, by which the milk is effectually diluted and depreciated while being formed, the consumer is wronged as

effectually as if the milkman had poured water into his milk with a dipper.

The course adopted by the City Court now allows this mode of cheating to its fullest extent to be turned against the consumer. This is all wrong, and either the courts or the Legislature ought to remedy it. What is wanting is a law prescribing what shall constitute a given measure of milk, as it does a given measure of other things. A bushel of wheat, for instance, must have a certain specific gravity, — it must weigh sixty pounds. If it contains more than the established weight, the purchaser must pay accordingly; if less, the seller must make up the deficiency. The dealers have a definite standard by which to regulate their transactions. A quart of milk should have a definition equally exact, to be determined by instruments or analysis, so that the producer or seller shall have pay according to the merit of his goods, and the purchaser shall have what he bargains for."

"Carelessness of the Modern Herods.

The remark of your correspondent C. G. T., that 'milk that has been adulterated with water alone is not unwholesome,' needs some qualification. Unless the water used has been boiled, milk diluted with water spoils sooner than pure milk, where all other circumstances are the same. This result will occur with average well-water. Men who water milk do it slyly, and cannot be expected to boil the water or even to be careful to get the purest. The more impure the water used, the shorter the time will be before the milk spoils in which it is mixed. The failure of milkmen to dilute with the best of water is evidently a prominent cause of the poor keeping qualities of their mixture. Is it not fair to infer that milk in which incipient decay is going on, by reason of added water, is less wholesome for infants, and also for adults, than milk which has not been tampered with, but is pure and sound? L. B. A."

"Dr Doremus, the well-known Professor of Chemistry in New York University, addressed the Medico-Legal Society of New York, on Wednesday evening, and introduced some novel theories, which cannot fail to interest and instruct not only those who sell, but those who buy milk.

The doctor said the lactometer does not indicate the purity of milk, and then proceeded to demonstrate the truth of his statement upon the spot, as follows: Taking the lactometer in his hand, he said, 'Now here is some milk obtained

from a cow this afternoon. I know it is pure. I dip the lactometer into it, and it stands at 105. I now pour some cream into the milk and the lactometer gradually sinks to 32 in pure cream! Now I take some of the same milk in which the instrument stands at 105 and pour in water, and precisely the same result is achieved, — the scale marks about 32; so that we may have two samples of milk, one rich in cream and the other amply diluted with water, and the lactometer shows precisely the same purity. I found the other day, experimenting with a sample of pure milk that stood at 113 with the lactometer, on removing the cream it stood at 135, thus leaving a discrepancy which permitted — nay, invited — the addition of one-seventh of water.

In Orange County twelve cows were milked in my presence. I took a sample of the milk of each, and five out of the twelve stood below the standard, 100; they ran from 95 down to 90, and, subjecting the milk to chemical analysis, I found the fact was owing to its richness in cream. I told the owner of the cows that he dared not bring such milk into New York, for he would be fined $250. According to these tests, made by the most renowned chemist in the country, our methods for ascertaining the purity of milk are altogether wrong and unreliable, if the lactometer is used for testing. But we have the impression that the milk inspectors of Massachusetts use the hydrometer instead; and if so their estimates are much more to be relied upon when the milk is new. But if the test is delayed until the cream separates, no reliance whatever can be placed upon it, for the reasons that the creamy adhesions to the tube will act as a float to the same, and prevent a true registration of the gravity. And yet men are constantly being fined by milk inspectors upon the unreliable testimony of such imperfect instruments as these, which render the milkman as liable to a fine who sells milk of extraordinary purity as he who sells the water-diluted lacteal products of a "still-fed" herd. We pay a great deal for wisdom, but what we get is often very much like our milk, very unreliable.'"

[*Extracts from the New York Tribune.*]

"CITY MILK AND MODERN HERODS.

Till all the world is honest there need be no hope of perfect purity in the articles which trade and commerce supply. It is declared that the well-known tendency of all modern paintings to fade and deteriorate is due to the invariable adulteration of some of the pigments. If all else

were pure, the oils, it is said, are never wholly genuine; their adulteration begins with the first steps in their production in distant climes. Similar tricks with almost all foreign drugs are the despair of physicians. Every one of our doctors in large practice can relate, from his own experience, instances where human lives were lost because the drugs administered were inferior in strength to what they should have been; tampered with, perhaps, before they left India or Peru. To a far simpler form of adulteration, practised in all our large cities, a very considerable percentage of infant mortality is unquestionably due; inferior milk is a chief agency in adding to the babies' death-roll.

Our dairy correspondent, who is the highest authority on such subjects, in another column throws light upon this point. It is often asked, how does it happen that poor milk is so injurious to infants? Nothing but water is added to the milk; what great harm can that do? If pure, distilled water were used by the rascally milkmen the only harm done might be to the pockets of the buyer. But ordinary spring-water, added to milk some hours in advance of its use, changes the character of the milk itself, and renders it more prone to decompose. This condition is aggravated if the water is impure. It follows that the usual mixing of water with milk for sale produces an article which is not only deteriorated, but, in some degree, poisonous.

The most efficient system yet put in practice for checking such fraud is that which the Board of Health has adopted. It is not theoretically perfect. It permits the dishonest milkman to put some water into his cans without bringing him under the penalties of the law; but it has already resulted in largely reducing the amount and frequency of adulteration.

The clear explanation supplied by Prof. Arnold will enable persons who can give more time to it than the average public to arrive at accurate knowledge as to the quality of the milk they are supplied with. Two instruments are required for this purpose; and it should not be difficult for some ingenious inventor to couple them, for popular sale, with clear and simple directions for their use. In that case, it is to be hoped that the galactometer will be given its proper name, instead of the barbarous compound, 'creamometer' — a word in which tongues are mixed as execrably as ever milk has been.

But the total suppression of milk frauds is not to be achieved, as our correspondent hopes, simply by decisions of courts or acts of the Legislature. Not even if the milking is done at one's very door is purity insured. The

invalids sent to the shores of Italy have this sad experience. The animal stands at the gate, and the milker operates apparently in full view. But, under his arm, concealed by a cloak, there is a bladder filled with water, which is squeezed from time to time as the milking proceeds."

[*Extract from Hon. J. H. George's Address.*]

"Treatment of Cows.

With regard to the treatment of cows, I believe kindness and gentleness of the first importance. A harsh word ought not to be spoken, and *a blow* never given. Many an excellent cow has been ruined, not only in her disposition and habits, but in her milking qualities, by rough treatment. A milking cow should be carefully sheltered from the cold and storms; should be watered, fed, and milked at regular hours; should be well bedded, and kept clean and comfortable in warm, light, and well-ventilated barns.

I know no greater waste than that permitted by subjecting a herd of milch cows, day by day, to the cold, shivering blasts and storms of winter, to a rough bed upon the frozen manure in a cold hovel by night, accompanied by irregularity of watering, feeding and milking. A cow, in order to secrete the largest quantity and the best quality of milk, upon given feed, requires to be as quiet, comfortable, and as free from the excitement incident upon ill-usage, as possible. And I feel confident that in no way can our farmers increase their profits more easily than by increased care of their milch cows. While stock other than milch cows may better endure rough treatment, still I believe the farmer consults *true* economy, who bestows upon all his neat stock the care I have suggested for his cows.

Instead of the young cattle going to the pasture in the spring lighter than they came to the barn in the fall he will, by such treatment, gain, in the extra growth during the winter, double payment for the care bestowed. I never see a herd of cattle shivering beside a sheltered wood-pile without thinking of the ludicrous inconsistency of protecting the wood from damage by the weather, and leaving the animals exposed to its *worst effects*."

[*Extract from the Lewiston Journal.*]

"Best Milk-producing Food.

There is no doubt a difference in the quality of milk in different cows, some being rich in caseine or cheese, and that of the other in butter; yet as a rule the milk will be,

in a great measure, what it is made to be by the feed of the cow.

The milk from the same cows may be varied by feed, from 80, by the lactometer, up to 115 degrees, the highest number being the best, and such as is produced by the heaviest food.

In a carefully tried experiment which I made last winter I found that heavy food, such as corn, wheat, and rye shorts, fed to twelve cows, pound for pound, did not make as much milk as wheat bran, into nine quarts a day; and I have no doubt, for a time, this would invariably be the result, yet I should not dare to continue for any considerable length of time to feed my cows upon wheat bran alone, as it would undoubtedly diminish the strength of the cow, and reduce her to a condition in which she would be incapable of giving very much milk. I am now feeding to twelve cows two bushels of wheat bran mixed with one bushel of corn meal ground in the cob, with very satisfactory results. The milk is good, the strength of the animal is kept up, and a diminished amount of hay will keep the cow in a good, thriving condition. I feed twice a day.

It is yet an open question whether the feed should be fed wet or dry. There is no doubt but that in cold weather it would be much better if the water, which is required by cows in milk, could be warmed.

If taken into the system while at a very low temperature the process of digestion will be retarded until the temperature of the water is raised to blood heat. In warming this water digestion is not only retarded, but there will be a loss of a certain amount of food, which, like fuel, is consumed in keeping up the heat of the body; and this accounts for the fact that a herd of cattle require very much more feed in extreme cold weather. It will be evident, therefore, that a large amount of food may be saved by warm stabling in cold weather, and consequently a much greater secretion of milk is secured.

The great mass of the community are, no doubt, ignorant in regard to the great difference in the quality of milk made by the different kinds of feed. Milk made from a cow fed upon turnips and buckwheat bran or buckwheat shorts is totally unfit for a young child or its mother, and there is no doubt that the mortality among children is often caused by the improper food of which the milk is made.

Roots, especially carrots, increase the flow of milk and of the best quality, and will tend to keep the cow in good health. Apples will increase the quantity of milk nearly as much as turnips, and of much better quality.

In making milk there is nothing more important than good early cut hay. Without this it may be doubted whether milk can be made with profit."

"Does Cooking Injure the Health of Stock?

The world will never quite get rid of its old fogies — those who want to be natural, but have never studied nature.

When fodder shall be cooked so as to be softer and more succulent than grass, which nature has furnished for the animal, then it will do to inquire whether nature is not violated in cooking food for cattle. Nature furnishes grass, not dry fodder. The dried fodder is man's work of preserving food while grass does not grow, and if he cooks this soft and succulent in imitation of grass, does he run a tilt with nature, or is he imitating her?

A farmer always looks forward to the new growth of grass in the spring as affording an opportunity for his cattle to improve in condition and health, and when he cooks thoroughly his winter food his cattle are simply kept upon grass the year round.

We have kept the same cows upon cooked food for fifteen winters, and found them vigorous at nineteen and twenty years old." — *Live Stock Journal.*

Here is what Professor Wilkinson, of Baltimore, M.D., says in relation to cooked food for cattle: "I conducted an agricultural school and experimental farm for eight years, and experimented with feeding cooked and uncooked food of every description used for cows, horses, swine, working and fattening cattle and poultry, and carefully noted the result, which was in all cases very remunerative; so much so that even with the defective, inconvenient and expensive apparatus used — for want of better — in steaming, manipulating and feeding, I found there was an average profit of fully twenty-five per cent.; that is, in feeding the variety of animals named; but in feeding milch cows in cold weather with warmed, steamed food of every description, there was a profit of over thirty-five per cent., when the animals were kept at proper temperature, and fed with proper proportions of nutritious food."

The following valuable information in regard to milk and its adulteration has been received from Mr. John M. Merrick, consulting chemist of No. 59 Broad street, Boston. He says, "In accordance with your request I send you a

tabular statement of the results of the analysis of milk which I have made from samples furnished by you, commencing April 1, 1875.

Analysis, No. and Mark.	Specific Gravity.	Per cent of Cream.	Caseine Sugar and Salts.	Total Solids.	Water.	Per cent. of added Water.
366	1.026	5.75	7.50	10.12	89.88	19.36
367	1.028	6.50	7.71	10.61	89.39	17.09
368	1.026	6.00	9.02	11.41	88.59	3.01
369	1.022	4.50	6.35	8.53	91.47	31.72
370	1.026	5.00	8.53	10.31	89.69	8.30
371	1.026	4.50	5.15	8.25	91.75	44.63
372	1.024	5.00	7.91	9.30	90.70	14.95
.	1.031	13.50	9.20	12.75	87.25	
373	1.024	5.70	7.26	9.61	90.39	21.83
374	1.022	8.00	6.57	8.27	91.73	29.36
375	1.025	12.00	9.46	13.00	87.00	
376	1.025	3.00	7.00	9.00	91.00	24.74
377	1.027	5.00	7.49	8.94	91.06	19.57
378	1.026	10.50	9.30	12.10	87.90	
379	1.024	6.00	8.07	11.11	88.89	13.23
380	1.024	7.50	8.37	11.50	88.50	10.00
381	1.025	6.00	7.62	9.78	90.22	18.00
382	1.025	9.00	9.43	12.08	87.92	
383	1.026	5.30	7.00	10.03	89.97	24.75
384	1.017	6.00	5.22	7.43	92.57	43.88
385	1.024	9.00	8.05	9.90	90.10	13.50
386	1.024	5.50	7.90	9.74	90.26	15.10
387	1.018	4.70	5.60	7.34	92.66	39.79
388	1.027	7.00	8.71	11.90	88.10	6.35
389	1.026	4.50	8.18	10.00	90.00	12.05
390	1.033	5.00	9.75	12.13	87.87	
Average amount of adulteration						17.25

In regard to the matter of milk analysis the following extract from the proceedings of the Society of Public Analysts (England) is of interest. Prof. Redwood, the President, says, 'I believe there is no better criterion by which to judge of the genuineness of cows' milk as supplied to the public than that which is founded on the proportion of non-

fatty residue obtained by the evaporation of the milk at the temperature of boiling water.' If, in addition to this determination, which is the basis of Mr. Wanklyn's method of testing milk, we ascertain the specific gravity of the milk, the quantity of ash it yields, and the nature of the ash, we have all that is required for indicating the presence, and approximatively the proportion, of the common and almost the only adulterant water.

I have always adopted this method by testing milk, and have taken 9.3 parts by weight of non-fatty solids in 100 parts, by measure, as the assumed smallest proportion of those constituents in genuine cows' milk.

This corresponds to 9 per cent. by weight.

Having occasion to make a large number of milk analyses, not only in my capacity of public analyst, but unofficially for several extensive milk-dealers, who are also cow-keepers, I am enabled to express a decided opinion, founded upon the examination of samples obtained directly from the cow, under many different circumstances, as to breed, age, mode of feeding, and length of time since calving, that the standard or limit adopted by this society is a safe and fair one.

Although many of the samples I have had to examine unofficially have represented in each case the milk of a single cow, under special circumstances, and intended to test the correctness of the standard adopted, I have never met with an instance in which the proportion of non-fatty solids fell below the standard I have referred to in milk obtained from a healthy cow, fairly fed, and fit for the supply of so important an article of food as milk.

But while 9 per cent. by weight may be taken as a fair representation of the limit below which the non-fatty solids do not fall under the circumstances stated, the proportion is generally higher than this, and is often more than 10 per cent.; and as the milk supplied to the public is in most cases the product of several cows, it is reasonable to expect that the limit should be generally exceeded. If it should be found that the milk supplied by a dealer was constantly close upon the limit, it would be fair to infer that some amount of dilution was resorted to, and in cases of this kind I have sometimes recommended prosecutions, where the analysis only indicated a small percentage of adulteration according to the standard taken.

This statement of my experience merely tends to confirm the results obtained by other analysts, and especially those of Mr. Wanklyn.

The variation in the total solids found in the milk of in-

dividual cows, even if these variations sometimes bring the total amount a little low, theoretically, are not of very great moment, since it is highly improbable that a pint of milk supplied by a dealer is entirely composed of the milk of one animal. Again, once in a while we come across some entirely abnormal case, such as that recently reported by Sharples. [*See Proceedings Am. Acad., Dec. 14, 1875.*]

When a certain cow gave, on two occasions, milk containing fifty-four and eighteen per cent. of cream, in the first sample the solids, not fat, were only 7.88 per cent.; but there is little danger of any injustice being done to a dealer who supplies milk that is half cream.

I have recently made several analyses of pure milk to satisfy some milk farmers of the character of the milk sold by them, two of which I quote, as samples of milk showing a high per cent. of solids.

No. 1.		**No. 2.**	
Water	85.26		86.63
Total solids	14.74		13.37
	100.00		100.00
Fat	4.42		3.50
Caseine	4.26	Caseine and Sugar	9.11
Sugar	5.27		
Ash	.79		.76
	14.74		13.37
Specific gravity	10.28		10.28
Cream	9.50 pr. ct.	Cream	8.80

These two samples, having 'solids not fat,' 10.32 and 9.87 per cent. respectively, would have to be reported as 110 and 109 per cent. theoretically.

The wild stories that newspaper reporters once in a while set afloat about 'tons of borax,' phosphate of lime, chalk, etc., being used to adulterate milk have not been corrob-

erated by any *facts* brought to my notice during the past year.

As regards the treatment milk adulterators receive in the English courts, the following cases which are reported during the past year are instructive : —

A *batch* of milk-adulteration cases recently disposed of at the Greenwich Police Court gave occasion for the display of a phase of the magisterial mind which is, perhaps, unique.

The cases were five in number. The largest quantity of added water certified to was 33 per cent, and, as the defendant in this case was fined 40 s., no special remarks are called for.

Of the other four milk-dealers, one had added 10 per cent. of water, one 15 per cent., and the remaining two each 18 per cent. The first case the magistrate at once dismissed, asserting his opinion that the discovery of such a small quantity of added water was an analytical impossibility. The solids not fat in this case were only 7.92. The other three cases were adjourned for a week, to enable the magistrate to make up his mind.

At the adjourned hearing the analyst was in attendance to verify his results, but the magistrate declined to let him be examined, and, notwithstanding that there was no defence and no counter-testimony, he simply ordered the defendants to pay the cost of the summonses, some two shillings each.

The amount of solids not fat in these three cases was, respectively, 7.11, 7.42, 7.32.

As illustrating the different views held by different magistrates as to the capability of adulteration, we may mention two very recent milk cases, in both of which convictions were obtained and penalties inflicted, but in strangely varying proportion.

At Woolwich a dairyman was convicted of adding 16 per cent. of water to his milk. The magistrate admitted that he was compelled to convict him, but affirmed his belief that the defendant was 'a respectable man, who would not defraud the public,' and to express his opinion he inflicted a fine of *half a crown*, and two shillings cost.

At the Safford Police Court, another dairyman was convicted of adding 29 per cent. of water to his milk, and was promptly fined *twenty pounds* and cost, without even the alleviating accompaniment of an expression of magisterial regret.

It would almost appear, from these two cases, as if geography must have something to do in determining the relative criminality of persons selling adulterated articles, as what is

clearly quite a venial offence in Kent becomes rather a serious matter in Lancashire.

Very truly your ob't serv't,

JOHN M. MERRICK,

Consulting Chemist."

During the past seventeen years I have used the lactometer to assist in the examination of more than thirty-two thousand different samples of milk, from cows of various breeds, and with great variety in the kind of food and general manner of keeping them.

Whatever assistance the lactometer may be in the examination of a sample of milk, it will only approximate to the amount of added water, which may change the specific gravity of the milk. I say added water, because all or nearly all of our adulteration amounts to nothing more or less than extending the milk with water. It is true, however, that many of our dealers in milk (especially in the city) dilute their milk with water colored with caramel, perhaps a grain or two in a pint. This is not deleterious any more than molasses, but still an experienced eye will detect it at once, and by its presence we are led to suspect that the sample is more or less extended by water.

In all my examinations of milk I carefully observe the color, after placing the sample in a crystal glass tube which holds about one-half pint. I then taste the milk to ascertain if the sample contains a large or small amount of cream; and by the lactometer the specific gravity of the sample is determined.

If I find the milk rich in cream, it readily accounts for its low specific gravity; if, on the other hand, the sample is poor and thin, I see at once that the specific gravity is reduced by the amount of added water.

The lactometer, for testing milk, amounts to but little, except in the hand of persons of experience in its use; and even then it is only advisatory whether to have the sample analyzed by the chemist or not.

I may here observe that in the enactment of laws in this State in regard to the sale and conviction of venders of adulterated milk, the only evidence as to its adulteration admissable in our courts is a chemical analysis of the milk, with a sworn certificate by the analyst.

It may not be generally known that whenever and wherever purchasers have doubts in regard to the quality of their milk, they have only to notify the inspector, at No. 30 Pemberton square, to receive his prompt attention, free of all expense.

CHEMICAL ANALYSES OF MILK DURING THE YEAR 1865-66.		CHEMICAL ANALYSES OF MILK DURING THE YEAR 1875-76.	
ANALYSIS NUMBER AND MARK.	Amount of Adulteration; added water.	ANALYSIS NUMBER AND MARK.	Amount of Adulteration; added water.
No. 119	34.89	No. 366	19.36
" 120	32.56	" 367	17.09
" 121	25.59	" 368	3.01
" 122	30.29	" 369	31.72
" 123	34.89	" 370	8.30
" 124	33.73	" 371	44.63
" 125	32.56	" 372	14.95
" 126	34.89	"	. . .
" 127	41.87	" 373	21.83
" 128	48.84	" 374	29.36
" 129	30.24	" 375	. . .
" 130	32.56	" 376	24.72
" 131	26.75	" 377	19.57
" 132	34.89	" 378	. . .
" 133	18.61	" 379	13.23
" 134	25.58	" 380	10.00
" 135	34.89	" 381	18.00
" 136	51.17	" 382	. . .
" 137	23.26	" 383	24.75
" 138	30.24	" 384	43.88
" 139	27.91	" 385	13.50
" 140	41.87	" 386	15.10
" 141	25.59	" 387	39.79
" 142	27.91	" 388	06.35
" 143	40.70	" 389	12.05
" 144	46.52	" 390	. . .
Average amount of adulteration	33.42	Average amount of adulteration	17.25

In closing this report, your inspector would acknowledge the kind assistance rendered by the prosecuting attorneys and officers of the courts.

I feel obliged especially to mention the valuable services rendered by John M. Merrick, consulting chemist, and the invariable promptness with which those services have been performed.

Respectfully submitted,

HENRY FAXON,
Inspector.

No. 30 Pemberton Square.
Boston, March 31st, 1876.

637.6

CITY OF BOSTON.

City Document No. 37.

EIGHTEENTH ANNUAL REPORT OF THE INSPECTOR OF MILK, 1877.

To His Honor the Mayor and Board of Aldermen of the City of Boston: —

Gentlemen, — Your Inspector respectfully submits the Annual Report of his office for the year ending March 31st, 1877.

The year just closed has been an eventful one to those engaged in the milk trade, as well as those pursuing other branches of business.

With few exceptions, during the extreme hot weather of July and August, our supply of milk has been more than enough to meet the demand; consequently much less adulteration has been practised than in some former years.

The season has been favorable for raising milk, and large quantities, for which there was no demand, have been returned to the producer, or sent to the butter and cheese factories.

The pressure of the times again has compelled thousands of consumers to reduce their supply, and many of the poorer classes have been obliged to abandon its use altogether.

A considerable number of changes have taken place in the milk business during the year; some of the old dealers have been hard-pressed, and many of the new beginners, more hopeful of success, have invested a few hundred dollars in a milk route, only to find at the close of three or four months that in reality their route belonged to parties who had supplied them with milk.

It has been my earnest desire to keep the subject of adulterated milk before the people, so that they might, if necessary, avail themselves of the assistance and protection which the law affords.

During the past year I have examined about *two thousand* samples of milk, mostly in stores and shops, some in private families, at the milk depots, and at the office.

As a matter of course the general duties of the Inspector are about the same from year to year.

The laws of the Commonwealth require that he shall keep an office, and books of record, etc., and prosecute before the proper tribunal all such violations of law as shall come to his knowledge.

With these provisions of the law I have faithfully and strictly complied.

The milk trade of Boston, as I stated in my previous report, is divided into two branches, for which separate sets of books are kept at the office of the Inspector.

1st. Wholesale dealers, who distribute milk to families, stores, etc., from carriages, or who keep more than one cow.

2d. Retail dealers; who sell in small quantities from market places, stores, shops and cellars.

Number of cows kept within the limits of the City of Boston, 1,739, viz.: —

Number in the city proper	25
Number in the Dorchester district	580
Number in the Roxbury district	412
Number in South Boston	100
Number in East Boston	150
Number in the Charlestown district	22
Number in the Brighton district	160
Number in the West Roxbury district	290
	1,739

Number of persons who keep but one cow	515
There have been recorded the names and places of business of wholesale dealers in milk since last report	70
Whole number of wholesale dealers registered	1,714
Number of wholesale dealers now in the business	745
Number of wholesale dealers now selling from carriages	395
Number of small wholesale dealers who keep more than one cow, and sell to the neighborhood	350
Number of retailers in milk recorded since last report	28
Whole number of retail dealers recorded to date	3,416
Number of samples of milk inspected since last report	1,988
Number not adulterated	1,545
Number more or less adulterated	443
Number of cases analyzed by chemist	25

Average amount of adulteration in the cases analyzed	14.13
Largest amount of adulteration (water intentionally added in 100 parts) in the cases analyzed	35.38
Least amount of adulteration (added water) in the cases analyzed	00.30
Number of samples analyzed, including above, and not adulterated	4
Whole number of samples of milk analyzed to date	415
Number of cases pending in the courts at the date of last report	
Number of complaints in the municipal courts	6
Number convicted in the municipal courts	6
Whole number of complaints in court to date	285
Whole number convicted to date	213
Whole number not convicted	72
Number of cases now pending in the courts	
Number of gallons of daily supply of milk for the City of Boston	30,388
Estimated daily cost to consumers	$9,724 16
Number of gallons for supply one year	11,091,620
Estimated cost to consumers one year	$3,549,318 40

The expenses of this office have been as follows, viz. : —

For the analysis of milk	$240 00
Stationery, record books, advertising, printing, etc.	83 83
Inspectors' small bills for assistance, lactometers, and other instruments	27 50
	$351 33

For violations of the milk law there have been in the municipal courts fines and costs amounting to	$324 60
One half of the amount of fines has been paid to the complainants, viz. : —	$150 00

It may be of interest to the milk producers as well as to consumers, to know that the matter of the adulteration of milk is annually exciting more and more interest in the community.

A number of cases of adulterated milk have been this year before the courts in one of the neighboring cities.

These cases were strenuously contested in the lower courts

and were finally carried to the Supreme Court for a final decision.

The Board of Health of the City of New York have considered the subject of adulterated milk of sufficient importance to cause the enactment of special laws and the appointment of inspectors; by which means many offenders have been brought to justice during the past season.

In pursuance of enactments of the Legislature in 1858 and 1859, this office was established, and it commenced its work August 10th, 1859. Its records show that between four and five hundred samples of milk have been analyzed; about three hundred complaints have been made in our courts; and at least thirty-five thousand samples of milk have been examined; — thus giving this office an experience not acquired by any similar office in the country.

For general information on the subject of milk and its adulteration, I may be allowed to incorporate in this report the existing laws of the State, and such matters as may be of interest to the governments of other cities and towns, who are frequently seeking information from this office.

EXTRACTS FROM ACTS IN RELATION TO THE SALE AND INSPECTION OF MILK.

(Acts 1864, Chapter 122.)

Be it enacted, etc., as follows: —

SECTION 1. The Mayor and Aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be Inspectors of Milk, for their respective places, who shall, before entering upon the duties of their office, be sworn. Each inspector shall give notice of his appointment by publishing the same two weeks in a newspaper published in his city or town; or, if no newspaper is published therein, by posting up such notice in two or more public places in such city or town.

SECT. 2. The Inspector shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They may enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof, and cause the same to be analyzed, or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admissible in evidence in all prosecutions under this act.

The inspector shall receive such compensation as the Mayor and Aldermen or Selectmen shall determine.

SECT. 3. [Repealed by Acts of 1867.]

SECT. 4. Whoever neglects to cause his name and place of business to be recorded in the inspector's books, and his name legibly placed upon all carriages used by him in the conveyance of milk, before engaging in the sale thereof, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence fifty dollars.

And whoever offers for sale milk produced from cows fed upon refuse of distilleries, or any substance deleterious to the quality of the milk,

or whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first and fifty dollars for every subsequent offence.

And whoever, in the employment of another, knowingly violates any provision of this section shall be held equally guilty with the principal, and suffer the same penalty.

SECT. 5. It shall be the duty of the inspector to cause the name and place of business of all persons convicted under the preceding section to be published in two newspapers printed in the town or county where the offence may have been committed.

SECT. 6. All acts and parts of acts inconsistent herewith are hereby repealed.

[Approved March 30, 1864.]

(Acts 1872, Chapter 319.)

An Act to prevent the sale or exchange of adulterated milk.

Be it enacted, etc., as follows:—

SECTION 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than twenty, nor more than one hundred dollars; and for any subsequent offence, by a fine of not less than fifty, nor more than three hundred dollars.

SECT. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalty provided in the preceding section.

SECT. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty, nor more than three hundred dollars; and for any subsequent offence by a fine of not less than one hundred dollars, and imprisonment in the House of Correction not less than thirty nor more than ninety days.

SECT. 4. Violations of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction, and one-half of any fine paid shall go to the complainant.

SECT. 5. All acts and parts of acts inconsistent herewith are hereby repealed; but such repeal shall not affect any prosecutions now pending.

SECT. 6. This act shall take effect upon its passage.

[Approved May 4, 1872.]

During the winter of 1873 an act was passed by the Legislature, of which the following is a true copy: —

(Acts 1873, Chapter 180.)

An Act concerning the purchasing of milk and the size of milk-cans.

Be it enacted, etc., as follows:—

SECTION 1. All milk-cans used by persons engaged in the business of purchasing milk at wholesale shall be sealed annually by the sealer of weights and measures in the city or town where the purchaser resides,

and no milk-can shall be sealed which does not contain one or more quarts, without the fractional parts of a quart, and the capacity of the can shall be legibly marked upon it by such sealer.

SECT. 2. When milk is purchased by the can, such can shall hold eight quarts of milk, and no more.

SECT. 3. Every person violating the provisions of this act shall be punished by a fine of not less than twenty dollars nor more than fifty dollars, one-half of which fine shall inure to the use of the complainant.

SECT. 4. This act shall take effect on the first day of July next.

[Approved April 14, 1873.]

Whatever the effect of this law may have been, I have not heard that any complaints were made to the courts during the year, or that any effort was made for carrying out the intentions of the law.

The following information, being useful from year to year, is inserted from my last report: —

The contracts for the supply of milk are generally made twice a year, viz.: on the first of April and the first of October.

The milk-cans used for the conveyance and sale of milk by the dealers are of two classes.

The large cans, which hold nine quarts and a pint, are in general use by the milk trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston.

The smaller cans, which hold eight quarts and one-half pint, are mostly in use on the Fitchburg, Lowell and Eastern Railroads; and no milkman is considered equipped for business unless he is the owner of four or five full sets of cans, either *eights* or *nines*, as above described, sufficient to contain the milk necessary for his daily route; one set being in use while the others are on their way to the country for a fresh supply.

Many of the milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans in quantities to suit their customers.

These cans are left within the houses, or at some designated place on the premises. These small cans are, or should be, filled in the afternoon previous to their delivery the next morning, thus affording sufficient cream for family use.

The price of milk has varied considerably from former prices during the past year, viz.: At the farmer's door, from thirty to forty cents per can, and at the depots, in or near the city, after its collection and transportation, from thirty-

eight to forty-five cents. The milk is sold by the milkmen to stores, shops, eating-houses, etc., at from fifty to sixty cents per can, and is retailed in smaller quantities to families at from seven to eight cents per quart.

Such have been the general prices; yet many of the milk dealers, owing to the great competition in the trade, and the unusually large supply of milk, would buy and sell at greatly reduced prices.

Thousands of cans of good milk have been retailed this season, from some of our stores and shops, at five and six cents per quart.

My attention has often been called, during the season, to these places of cheap milk, only to find the article sold as such superior to the milk sold at the highest price in other places.

In the early part of the season my attention was called to a new grocery store at the Boston Highlands, where from eighteen to twenty-five cans of milk were daily disposed of at six cents per quart. This milk was examined and found to be of superior quality, and the low price for which it was sold would, of course, draw a large number of customers to the store for the milk, as well as for other articles of family consumption.

Whatever loss there might be on the milk would easily be made up by increased custom, and a cent or two advance on some other articles sold.

In the general inspection of the milk in stores and shops, during the past season, it was often found that some of the best milk was retailed to customers for a less price than it cost at the depots.

April, 1876. During this month the time of the Inspector was devoted to the general inspection of the milk in stores and shops at the Boston Highlands.

Our supply of milk at this time fully equalled the demand; consequently, but little adulteration was found in the places visited.

Admitting the standard of pure extra good milk to be 20° and pure good milk 19°, the average standard for this month was found to be 18¾°.

During this month some early morning calls were made in this section of the city, and samples of milk were taken from some of the milkmen as they were delivering milk to their customers. In more than one instance these samples were found to have been extended by the addition of water.

The attention of the Highland Municipal Court was called to these cases, and the offending parties plead guilty and paid the usual fine and costs. While inspecting the milk in

stores and shops, my attention was often called to the article left to families in the neighborhood.

In visiting all parts of the Highland district the large number of stores and shops found closed only confirmed the truth concerning the depressed condition of all branches of business.

May, 1876. — This month was very favorable for an ample supply of milk from the country, and the general inspection at the north and west parts of the city was never more satisfactory.

The northern part, for the past two or three years, has been mostly supplied with milk by persons who have never been disposed to tamper with the article except in times of extreme scarcity.

The average purity of the milk in the northern section was $18\frac{3}{4}°$, and the western part, $18\frac{1}{2}°$.

Notwithstanding the fact that the general character of the milk in both of these sections was found good, yet, on two or three occasions, adulteration was found, for which the parties passed through the court, paying the usual fine and costs.

June, 1876. — During the first part of this month, with few exceptions, the weather was cool and comfortable, and the supply of milk was about equal to the demand.

The Inspector's time was devoted to the examination of the milk in the Charlestown district.

About the middle of the month, as the weather grew warmer, the demand for milk became more urgent; the supply, however, continued to be about equal to the wants of consumers.

One or two of the new beginners were disposed to enlarge their trade by extending the milk to the amount of one-third water.

The court, however, was not disposed to look with favor on the transaction, and imposed the usual fine and costs.

While attending to the duties of my office, in this part of the city, frequent calls came from private families where their children were dependent on milk for their daily food.

The weather in the latter part of the month, with an occasional cool day, was sultry and hot, largely increasing the demand for milk, which flowed in, however, to the depots in sufficient quantities to satisfy all customers.

The average quality of the milk this month in the Charlestown district was found to be $18\frac{1}{4}°$.

July, 1876, to the 24th day of the month, was unusually hot and dry. On the 13th the thermometer stood at one hundred degrees. The weather soon lessened the supply of milk at all the depots, and with some of the dealers a sufficient supply could not be obtained for their customers.

During this month an unusually large number of families left the city to visit the Centennial, and other favorite places of resort. This afforded great relief to the milkmen, as it enabled them to meet more nearly the wants of those who remained.

The stores and shops in the central part of the city were visited this month, and the milk examined.

Notwithstanding the great demand and the limited supply, but two or three of our milk-and-water dealers were detected in vending the extended article. Some of these parties had previously been before the courts, and they were now dealt with accordingly.

In consequence of the extreme hot weather of this month, and the limited supply of milk, the average was but 17¾°.

August, 1876, nearly to the close of the month was hot and dry. At some of the milk stations the supply was so reduced that many of the dealers could not obtain the amount required for their customers.

This scarcity of milk, and the increased demand, both caused by the hot weather, showed itself plainly in the stores and shops by an increased amount of adulteration.

During this month a new milk-car was placed on the Boston & Albany Railroad, by the Westboro' Milk Company, who, during the season of scarcity, increased their resources by drawing a supply from more distant parts of the country.

With few exceptions the hot weather and the limited supply of milk continued to within a few days of the close of the month.

On the 28th the weather was quite cool, and the supply of milk was more satisfactory than it had been at any time previously during the month.

The general inspection of the milk was at the south part of the city. The supply of milk and the demand were about the same as during last month, consequently there was but little variation in the average of the quality, viz., 17⅝°.

September, 1876, was noticeable for its variable weather throughout the month. All, or nearly all, the milk depots furnished sufficient milk for the dealers to meet the demands of the consumers.

It may not be generally known that some of our benev-

olent ladies have provided homes in different parts of the city for infants, and for older children, who are yet too young to go to school. To these nurseries my services have often been asked during the year, for the purpose of insuring a supply of pure milk; and those services have been cheerfully rendered.

The milk in the stores and shops at East Boston was examined this month, and the average found to be 18°.

The milk-depot in this part of the city has often been visited, and the milk has been found, with few exceptions, in a satisfactory condition.

The milk-dealers from Charlestown, Somerville, and other places, assist in supplying East Boston with milk.

While attending to duties in this section, a number of samples of milk taken from the dealers were analyzed, but none were found sufficiently extended to justify a complaint.

October, 1876, was very favorable for an ample supply of milk. The demand, however, was limited, and the milk trade with all the dealers was considered very dull.

My examination of the milk was at South Boston, where many stores and shops were found closed. Nearly all these places formerly sold milk, and some of them large quantities daily.

The scarcity of money with our laboring class, and the general depression of business, have, according to the best estimates that can be made, reduced the daily quantity of milk delivered two thousand cans.

It was evident that, in the depressed condition of the business, the usual custom of raising the price on the first of October could not be sustained.

Some of the dealers, moreover, to retain their customers, were obliged to furnish their milk even below the summer prices.

The average purity of the milk in South Boston was 18¾°.

November and December. — In the districts of Dorchester, Brighton and West Roxbury there are many stores and shops which were visited during these two months for the inspection of the milk.

The facilities for keeping cows in these rural districts are of course better than pertain to any other part of the city; and many of the inhabitants have the means of supplying themselves and their neighbors also with milk.

The stores and shops are mostly supplied by the regular milkmen, who live in the neighborhood, or who pass through

the place on their way to the less rural districts, and the city proper.

The anniversaries of Thanksgiving and Christmas created but very little extra damand.

The supply was more than enough at nearly all of the milk stations, and the demand very limited, as compared with former years.

Samples of milk were frequently taken from the dealers, and on examination were found good.

Less milk was brought to the office by private families for inspection during these two months than at any time previously during the season.

I may here remark that the milk found in the districts of Dorchester, Brighton, and West Roxbury, is not tampered with to the extent which we often find it to be in other parts of the city.

The average quality of the milk for these two months was 19°.

In January, February and March there was but little demand for an extra quantity of milk. A few violent snow-storms obstructed travel and blockaded the sources of supply from the country. With these exceptions the milkmen were enabled to meet all demands, and generally their customers were well satisfied as to the quantity of the article supplied.

We have nine or ten railroad milk-stations, which supply us with a large part of our milk. All of them, with one or two exceptions, are located within the limits of the city.

These places have been visited often during the year, much to the satisfaction of not only the milk-contractor, but also the milkmen.

On some of these cars occasionally whole dairies are found more or less adulterated, and they are at once returned to the place whence they came.

In my examinations of the milk at the depots I have always received cheerful assistance, not only from the milk contractors, but also from the milkmen, in my endeavors to prevent the removal of adulterated milk from the cars for distribution.

In some of my former reports I have adverted to the frequency of finding adulterated milk on the cars at the depots, and of tracing the evil to the very door of the producer.

As an act of justice to myself and others, I may be allowed to state that early in the spring one of the milk-contractors on the Boston & Albany Railroad called at the Inspector's office. He stated that he was daily receiving a dairy of ten cans from the country, and these cans were sold to different

parties for distribution, and that they were all, or nearly all, returned to him as containing adulterated milk. He further stated that, from information obtained from his men, this dairy had been coming in this condition for more than a fortnight.

On the arrival of the milk-car the following morning the Inspector was present and examined each can of the suspected milk; and in every case the milk was found extended by the addition of water to the amount of 33 per cent., and deprived of nearly all of the cream.

This milk came from one of the towns situated on the line of the Boston & Albany Railroad.

This town was immediately visited by the Inspector, who, accompanied by the collector, proceeded to the place whence this dairy came.

With the assistance of the proprietor, ten cans of milk, marked No. 3, were taken from his premises and removed to a more convenient place, and were examined by the Inspector.

The milk in these cans was found in the same condition as in those inspected the day previous at the Boston depot.

A sample of this milk was analyzed by John M. Merrick, chemist, and was found to contain, in 100 parts, water intentionally added, 31.83; and only 4 per cent. of cream, instead of 10 or 12, as it should have had.

The papers and facts relating to this case were prepared and sent to the District Attorney of the county, on the ground that it was the duty of that officer to prosecute all criminal offences coming to his knowledge within that county.

It is more than eight months since those papers were sent by mail to that officer; yet, so far as any information could be obtained, he has never brought the case to the notice of the grand jury; nor has he acknowledged the receipt of the documents or letters of inquiry sent to him during the summer.

It may be observed that the *good old man* who extended the milk in this case, without waiting for a prosecution, came forward and settled the amount of damage with the parties to whom he sold the milk.

This settlement, however, does not alter or in any way change the duty of either the Inspector or the District Attorney.

The statement of the facts, however, will serve to exonerate the Inspector, inasmuch as they show that he used his best efforts to bring the offender to justice, and to fulfil the purpose for which the office he holds was established. He

has to regret that an officer bound to uphold the law should fail in his duty, and thereby shield from punishment one who would knowingly and wilfully make the law a nullity.

The following valuable information in regard to milk and its adulteration has been received from Mr. John M. Merrick, consulting chemist, of No. 59 Broad street, Boston.

He says, In accordance with your request I send you a tabular statement of the results of the analysis of milk, which I have made from samples furnished by you, commencing April 1, 1876 : —

Analysis, No. and Mark.	Specific Gravity.	Per cent. of Cream.	Caseine Sugar and Salts.	Total Solids.	Water.	Per cent. of added Water.
391	1.020	4.00	6.34	8.59	91.41	31.83
392	1.023	4.00	6.89	8.48	91.52	25.92
393	1.026	6.50	9.32	11.11	88.89	
394	1.022	5.00	7.04	9.34	90.66	24.09
395	1.025	2.50	7.14	9.05	90.95	23.23
396	1.024	4.00	7.67	11.20	88.80	17.53
397	1.020	6.00	7.30	9.60	90.40	21.50
398	1.027	9.00	9.30	12.20	87.80	
399	1.024	5.00	8.00	10.12	89.88	13.92
400	1.019	5.00	6.01	8.00	92.00	35.38
401	1.019	4.90	6.14	8.38	91.62	34.00
402	1.021	4.50	7.30	9.70	90.30	21.50
403	1.019	3.75	6.67	8.33	91.67	28.28
404	1.026	9.00	9.28	11.00	89.00	.30
405	1.021	5.00	6.86	8.70	91.30	26.24
406	1.024	7.80	8.30	11.50	88.50	10.00
407	1.025	6.80	8.97	11.01	88.99	3.55
408	1.031		11.60	15.32	84.68	
409	1.025	7.50	9.03	11.00	89.00	2.91
410	1.028	5.20	9.11	11.48	88.52	2.05
411	1.030	8.50	9.44	12.40	87.60	
412	1.028	5.00	9.23	10.92	89.08	.76
413	1.024	10.00	8.60	10.42	89.58	7.53
414	1.026	6.50	8.09	10.19	89.81	13.00
415	1.027	3.00	8.39	11.02	88.98	9.79
Average amount of adulteration						14.13

The percentage of amount of adulteration is a trifle less than last year, — last year being 17.25 per cent. of added water, and this year 14.13 per cent.

I have found no addition of any foreign substance to the milk analyzed by myself this year, except water, unless in two cases where the amount of added water was considerable, there may have been a little caromel. I have seen, however, one sample of milk brought to me for my inspection where an amount of extraneous color wholly unusual had undoubtedly been added.

With these trifling exceptions I have found only excess of water, and I can safely report what I said last year in your annual report, viz.: The wild stories that newspaper reporters once in a while set afloat, about tons of borax, phosphate of lime, chalk, etc., being used to adulterate milk, have not been corroborated by any facts brought to my notice during the past year.

For many years, in England especially, "sheep's brains" have been mysteriously spoken of as frequently added to milk; but year after year has slipped by without any proof of this nauseous adulteration. This last year, when a chemist would almost as soon express his belief in ghosts as in the addition of brains to milk, Mr. Sidney Gibbons, F. C. S., of Melbourne, Australia, stumbles on one solitary case of this form of adulteration; our report is as follows, in the "London Chemical News" for March 31st, 1876.

"As received, the sample had separated into three layers, of which the upper was thick and of a brownish, dirty gray color; the bottom resembled it, but was less in volume; and the intervening portion was white and thin. On being shaken, it assumed, without frothing, its thick and pulpy consistency, but soon separated again. Its density in this state was 1,022, but in five hours fell by dissociation to 1,016.

"On standing it yielded, as before, an upper layer of thick, gray pulp, of which most was at the top. It differed from cream, and showed but few large cream-cells. In amount it was, after standing the usual time, one-fifth of the entire column; but, on allowing this to remain, I found the measurement to alter materially, and, indeed, the proportions subsisting between the several layers were by no means constant.

"The lower portion was darker, and included much dirt, with sand and vegetal *débris;* on its surface torulæ abounded. Throughout, and chiefly in the gray pulp, was much granular and clotted matter, which 'took' magenta, and was thereby distinguished from the normal fat globules. There was no

added starch, and nothing that depolarized light except the sand, some cuticles of grasses, and a few granules of their starches.

"Many singular masses of the same type, but of varying size and form, somewhat resembling bean-pods, having a length of from two to six times their width, behaving optically like fat corpuscles. Others were larger, irregular and branched, clear, structureless, not polarizing, comparable in appearance to the vacuoles that form when a viscid medium dries up between glasses. Also many resembling caudate brain-cells (though not of the acute-angled and stellate forms), without apparent nuclei, not definitely tubular and without contents. Some large transparent round cells or oil-globules, not natural.

"These bodies, and a large part of the mixture which had not previously shown structure, took magenta freely, and then revealed fragments of what appeared to be nerve tubules.

"A 'large' piece, longer than the diameter of the field of view (0.015.), consisted of a ramification of tubules proceeding in the same direction, as having been normally parallel, but now partly spread radially, and connected by a fine transparent structureless tissue. Of this two sketches were made at different times. A notable feature was a sharp straight line, obviously a clean cut, which bounded it.

"All these indications seemed to point to nerve structure, as of cerebral matter, and to nothing else. The next thing was actual comparison under both conditions. I procured some brains, and, after preparing an emulsion, got a series of similar and accordant observations. There was, however, this marked difference: I did not succeed in producing a pulp so smooth as the milkman's, and always had a conspicuous amount of unbroken and unmistakable structures; whereas in the milk they had to be sought, but, saving the particular forms mentioned, they were to be found.

"It is probable that special precaution had been taken to break down as much as possible of the tissues by long digestion, and to strain off what proved intractable."

This seems to be the second well-authenticated case. Prof. Huckett adduced one in his evidence before a committee of the House of Commons in 1856.

The trouble and difficulty of this adulterating milk make it amazing that these two instances can be found.

What we have to contend with here is, as in other large cities, the fraudulent addition of water to milk offered for sale, or the removal of the cream before offering the residual milk for sale.

In my analyses of milk I have made no deviation from the method used last year, the results of which are shown in the table.

If I remember right, in no prosecution based by you upon analysis of adulterated milk furnished by myself have the results of these analyses been disputed by the parties most nearly interested.

The recent and unfinished trials in New York have excited renewed interest in the matter of milk analysis, and in the use of the lactometer. Unfortunately I have not, and shall not have, a copy of the evidence in these recent cases, in time to criticise it in the present report; and I must therefore content myself with repeating my belief that it is unwise and unjust to trust to any single test in pronouncing a sample of milk adulterated.

An *analysis* ought to be made before prosecuting a seller, and this I know is your custom. I should not be willing to appear against a milkman with no better evidence against him than one reading of a lactometer.

Mr. H. W. Vaughan says: "After many years' experience as State Assayer and City Chemist, in Providence, R. I., during six years of which time I have made the subject of milk, and the methods of recognizing its adulterations for legal purposes, a specialty, I have discarded the use of the lactometer as a means of detecting watered milk for the following reasons: —

"*First.* — Milk may be 'topped' or partially skimmed, thereby increasing its specific gravity, and permitting the addition of water sufficient to reduce it to its original density.

"*Second.* — Milk may be first 'topped' or partially skimmed, and then diluted with an aqueous solution of salt and sugar or both, of a specific gravity of 1.029, and colored to the desired shade with caramel, thereby giving it a cream-like appearance. By this method milk may be adulterated one-half, and still escape detection by the lactometer and the senses.

"*Third.* — The use of the lactometer places in the hands of the dairymen and milk-dealers, a means by which they can sell adulterated milk and still comply with the standard adopted by the Board of Health.

"*Fourth.* — A pure milk may be condemned simply because it is rich in cream.

"*Fifth.* — Because partially skimmed milk may be sold as whole milk without fear of detection.

"*Sixth.* — Because, in my opinion, it does not justify an officer in making an accusation of fraud when more accurate means are at command.

"*Seventh.* — Because the courts have decided in many of the Eastern towns and cities, Boston, Cambridge, Providence, etc., that a sworn chemical analysis proving adulteration is required for conviction."

Where a citizen's reputation is at stake he is justified in claiming a full chemical analysis of the suspected milk, as I have frequently found an apparently adulterated sample proved by analysis to be pure. I have also found, from years of practical experience, that when the milk traffic is controlled by a complete chemical analysis, adulteration has diminished and the required number of analyses necessarily decreased. Analysis will not only detect watered milk (the sole claim made in favor of the lactometer), but at the same time all other forms of adulteration.

With an analysis giving the percentage of solids, of solids not fat, of ash and of cream, we have a basis for a determination of the amount of adulteration which no lactometer reading can give.

Mr. Sharpley (Milk Analysis, Philadelphia, 1876, pages 5–6), after illustrating methods of calculating the added water upon a basis of total solids 12.5 per cent., or of solids not fat 9.3 per cent., and after showing the absolute identity of the results from his analysis, whichever way calculated, goes on to say, "It will be noticed that, in determining the added water, I have not taken into account the sugar, caseine, specific gravity, ash, or cream. All these enter into the account in a greater or less extent in making up my judgment as to whether the milk is watered, *and I would not be willing to rely upon any single determination* to say that the milk was watered."

This cautious dictum of a sound chemist may be compared with the following extract (from Smith on Foods, page 319), which has recently been quoted by the defence in a trial for selling adulterated milk. Speaking of milk, he says, "It is desirable that tests of specific gravity should be regularly applied by a purchaser, and a judgment formed of its true value, as is the practice when purchasing ardent spirits, and other *articles varying in strength. The lactometer effects this with readiness and efficiency.*"

The italics are my own, and I am in great doubt whether to admire more the looseness of Dr. Smith's grammar or the slopdash readiness with which he decides a knotty point in science.

To those who regard Dr. Smith as an authority I commend the following, found in the same book (Smith on Food, page 221). Speaking of strawberries in North America, he says, "They are of delicious flavor, and grow on bushes three or four feet high."

Again, on page 257, he says, speaking of maple sugar: "It is not generally prepared for sale it has other flavors besides those due to the sugar, and would not be preferred to the purified cane sugar at the market where that could be obtained at or about the same cost."

Smith on Food is quite as amusing as instructive.

Wanklyn, in his book upon Milk Analysis, pages 13–14, says, "Even in some recent manuals intended for the guidance of medical officers of health, the use of the lactometer is recommended. In one of them in particular, — Dr. Edward Smith's, — which claims a sort of pseudo-government sanction, the lactometer is very prominently put forward, and commended as being for milk what the hydrometer is for alcoholic fluids.

But, although it is so very popular, and although it has been so implicitly trusted, the lactometer is a most untrustworthy instrument. There hardly ever was an instrument which has so utterly failed as the lactometer.

It confounds together milk which is exceptionally rich, with milk which has been largely watered; and many a poor French peasant, bringing the best and unadulterated produce of his dairy into a French town, has been ruthlessly stopped by the police, who have dipped their lactometer into the milk, and forthwith sent it down the gutter, as if it had been milk and water.

Very curious things, too, are done in this country by reason of trust in the lactometer. There is a prison not far from London, and the prison authorities are specially particular about their supply of milk. They allow no milk to enter the prison unless it comes up to the M mark on a certain lactometer. The M mark is pitched very high, and the milk purveyor reaches the M mark by skimming the milk.

Von Baumhauer, in his method for the analysis of milk, translated by H. Carrington Bolton, Ph. D., pages 4–6, says, "Since the chief alteration to which milk is submitted consists in removing the cream and adding water, it has been supposed that the determination of the proportion of cream by means of the creamometer or the lactoscope, combined with a determination of the density by means of a hydrometer, sufficed to decide with certainty not only whether the milk had been sophisticated, but also to what degree the skimming and dilution had been practised.

"As to the determination of the specific gravity alone, notwithstanding that in certain countries this is the method of testing exclusively employed by the police, it is evident that we cannot learn much from it, since milk is a solution of substances specifically heavier than water, in which are suspended globules of cream specifically lighter than water; whence it of necessity follows that milk skimmed and diluted with water may have the same density as milk rich in cream and free from admixture of water."

In the task before me I endeavored to settle these three points: —

1st. Is the hydrometer fitted to give the density of milk with accuracy?

2d. Does the estimation of the density of skimmed milk make known the quantity of dissolved matter?

3d. Do the creamometer and the lactoscope indicate with accuracy the proportion of the fatty globules held in suspension?

In studying the first point I naturally had in view all the hydrometers of constant weight, without regard to the names they bear or the graduation with which they are provided.

I have already stated that, considered by themselves, and without a simultaneous determination of the proportion of the cream, the hydrometers do not give us much information as to the nature of fresh milk; but we must study to see if there are not still weightier reasons for regarding the use of hydrometers for milk as disadvantageous.

In the first place the coefficient of dilatation of milk is unknown; the tables which have been constructed in accordance with the experiments of certain observers do not merit our confidence, from the fact that the ratio of the soluble matters varies greatly in different samples of milk.

We are obliged, therefore, in using the hydrometer, to work invariably at one and the same temperature.

There is another circumstance which may cause the hydrometer to give very unreliable indications, especially if minute precautions are neglected. When a hydrometer is immersed in a liquid, and allowed to move freely, it sinks to a greater depth than that at which it will come to rest after a few oscillations, and at which its reading would be taken; this depth is, moreover, greater in proportion to the height above the point of equilibrium at which the instrument is let fall.

Therefore, since milk is a liquid more or less viscid, it is easy to see that the stem of the hydrometer, being moistened by the milk, retains a considerable quantity adhering to it,

which renders the weight of the instrument very variable. Experiments which I have made in this connection show that very serious errors may result, sufficiently great to be equivalent to a difference of five per cent. more or less water in the milk. It is, moreover, evident that these errors are greater the smaller the bulk of the hydrometer relatively to the diameter of the stem, so that with the small galactometer of A. Chevallier, which is so highly praised by Messrs. A. Chevallier and O. Reveil,* the errors would be larger than with the lactometers of large size generally used in this country [*i. e.*, in Holland].

By making comparative determinations of the density of different samples of milk by means of direct weighings and by the use of either Chevallier's galactometer or of Geisler's hydrometer (which has a volume of about 50 c.c. and a stem measuring scarcely 3 m.m. in diameter), I satisfied myself that the indications of these two instruments agreed very imperfectly with the results obtained by the first-named method.

This applies to skimmed milk, and, to a greater degree, to fresh milk; for the latter there is still another cause of error. Milk is actually a liquid heavier than water, in which lighter globules float with a tendency to come to the surface.

We have then a case similar to that of a viscid liquid, holding in confinement air-bubbles, which, by attaching themselves to the lower surface of the immersed body, necessarily vitiates to a certain extent the determination of the density. We will see presently that this error becomes much greater in the case of milk which has been violently agitated.

I found also that even in the case of skimmed milk, the specific gravity, though determined with great care, bears no fixed relation to the sum of the constituents held in solution; while, as to fresh milk, that goes without saying.

The density of the skimmed milk does not indicate the sum of substances held in solution, because the relative properties of sugar, caseine, extractive matter, and inorganic salts, is not the same in different samples of milk.

The following table of analyses of milk of cows and goats in Kingston, Jamaica,† made by Bororey, is interesting, and certainly shows that no injustice would be done there by the 12.5 standard of total solids, or the 9.3 standard of solids not fat.

* Notice sur le lait. Paris, 1856.

† "Chemical News," January 19, 1877.

Parts by weight in 100 C. C.

AT ONE MILKING.	Total Solids.	Fat.	Ash.	Solids, Not Fat.
Milk given by 5 cows	13.69	3.34	0.72	10.26
" " 4 "	13.85	3.97	0.73	9.88
5 quarts from 1 cow	12.97	2.26	0.84	10.71
5 " " " "	12.68	2.73	0.71	9.95
5 " " " "	14.83	4.97	0.76	9.86
5 " " " "	14.68	4.55	0.73	10.13
4 " " " "	11.77	1.52	0.74	10.25
4 " " " "	13.12	3.20	0.73	9.92
Goat's Milk	18.39	7.68	0.89	10.71
" "	17.44	7.12	0.68	10.32
" "	18.33	8.24	0.74	10.09
" "	18.51	7.89	0.80	10.62

Each sample was from different animals.

The simple taking the specific gravity of milk by the Inspector is of service, as indicating to him whether an analysis is admissible or not, but it should not be made to take the place of analysis.

I believe it useless to expatiate upon the importance of keeping up the standard of the milk supplied a great city. No one doubts this except the dealers who prefer selling water to selling milk; and few of them in their own souls believe that it is right to tamper with an article of food, especially with the food of children.

It is worth while here to quote from the argument of Mr. Prentice, counsel to the New York Board of Health, in the case of the People *vs.* Daniel Schrumpf. He says: —

"Gentlemen of the jury, in my opinion, which I believe is founded upon sufficiently accurate facts, there is brought into the city of New York about 400,000 quarts of milk a day, and to that quantity at least 100,000 quarts of water are added, making the daily supply of the so-called commercial milk of this city as it is sold here.

"I read from Beck's work on adulterations. He says: 'It is not without reason, therefore, that the great mortality among children in Paris is ascribed chiefly to the bad quality of the milk with which such a large number are constantly fed.'

"I read from Dr. Voelcker, who is regarded as undisputed authority in this case: 'Milk may be regarded as a kind of

model food. It supplies all the various elements of nutrition which are required to build up the bony frame and muscular tissue of the young, and at the same time supplies materials for supporting respiration and keeping up the animal heat of the body.

"Undiluted with water, milk is both a readily digestible and valuable, if not indispensable, article of food for children. Breeders of high-priced short-horns know full well how essential it is to the early development of a sound and strong frame, round which the flesh and fat may be afterwards deposited in symmetrical forms, not to stint the calf in milk, and it is to be feared that the children of the artisan and the poor in towns, and of the agricultural laborer in the country, are not nearly so well supplied with milk, both as regards quantity and quality, as the progeny of the well-cared-for herd of short-horns, or Ayrshire or Devon cows. If it be remembered that the bodily health of the adult is affected in no small degree by the amount and quality of the food with which the infant, from the time of its birth and throughout the period of childhood, is fed, and also that much physical suffering might be prevented if children were not stinted in a milk diet, it is doubly desirable that the scanty allowance of milk in which the children of the poor are generally indulged should be unadulterated, and of the best quality that can be procured.

"We hail, therefore, with pleasure, the enforcement of the food adulteration act, for there can be no question that before the act came into practical operation, the milk sold alike to the rich and poor in London and other large towns, was watered much more generally and to a greater extent than it is at present, in places where public analyzers keep a watch over the milkmen.

"It is a matter of public record, of which the court and you will take cognizance, that the Board of Health in this city began its operations in 1867. It found at that time the death-rate in this city, of children under five years of age, to be fifty-three per cent. of the whole number of deaths. Now, I will not stop to consider the general decrease, which has been marked, year by year, in the rate of the mortality in this city, but I will show you this one fact, that in 1875 the death-rate of children under five years of age, to whom of most importance is this question of the purity of milk, their principal food, the rate of mortality had decreased to 48¼ per cent. This means, upon the whole mortality, gentlemen, saving the lives of three thousand children per year. That decrease in the rate of mortality is owing, more than anything else, to the safeguards that have been thrown about

them in various ways, and especially their protection in the purity of their food. Now, statistics of writers go further upon this subject, and they say that for every death you may rate twenty-eight cases of serious illness.

"How vast becomes the calculation — the consideration of influences which are here before you, which, if these learned gentlemen are correct, you are to decide for or against, — for or against a standard, a means of protection and a safeguard; for or against the limit of adulteration without concern, for the profits of this distinguished defendant, or the liberty which he claims, about which his counsel has been so anxious. The liberty of what? The liberty of pursuing a dishonest trade, the liberty of evil doing."

Nothing but constant vigilance will keep up the standard of the purity of milk, in this or any other city. If the Inspector slumbers or neglects his work, the dealers, or the dishonest ones at least, will take advantage of the fact, and their milk will be the exception and not the rule.

Respectfully, yours,

JOHN M. MERRICK,
Consulting Chemist."

No. 59 Broad street, March, 1877.

CHEMICAL ANALYSIS OF MILK FOR THE YEAR ENDING MARCH 31, 1867.		CHEMICAL ANALYSIS OF MILK FOR THE YEAR ENDING MARCH 31, 1877.	
ANALYSIS NUMBER AND MARK.	Amount of Adulteration; added water.	ANALYSIS NUMBER AND MARK.	Amount of Adulteration; added water.
No. 138	34.24	No. 391	31.83
" 139	27.91	" 392	25.92
" 140	41.87	" 393	. . .
" 141	25.59	" 394	24.09
" 142	27.91	" 395	23.23
" 143	40.70	" 396	17.53
" 144	46.52	" 397	21.50
" 145	28.03	" 398	. . .
" 146	23.26	" 399	13.92
" 147	11.63	" 400	35.38
" 148	32.56	" 401	34.00
" 149	36.05	" 402	21.50
" 150	27.91	" 403	28.28
" 151	37.21	" 404	00.30
" 152	18.61	" 405	26.24
" 153	29.07	" 406	10.00
" 154	23.26	" 407	3.55
" 155	29.07	" 408	. . .
" 156	43.03	" 409	2.91
" 157	46.52	" 410	2.05
" 158	40.70	" 411	. . .
" 159	34.89	" 412	00.76
" 160	51.17	" 413	7.53
" 161	27.91	" 414	13.00
" 162	30.24	" 415	9.79
Average amount of adulteration	32.47	Average amount of adulteration	14.13

During the past eighteen years I have used the lactometer to assist in the examination of more than thirty-four thousand different samples of milk, from cows of various breeds, and with great variety in the kind of food and general manner of keeping them.

Whatever assistance the lactometer may be in the exami-

nation of a sample of milk, it will only aproximate to the amount of added water, which may change the specific gravity of the milk. I say added water, because all, or nearly all, of our adulteration amounts to nothing more nor less than extending the milk with water. It is true, however, that many of our dealers in milk (especially in the city), dilute their milk with water colored with caramel, perhaps a grain or two in a pint. This is not deleterious any more than molasses, but still an experienced eye will detect it at once, and by its presence we are led to suspect that the sample is more or less extended by water.

In all my examinations of milk I carefully observe the color, after placing the sample in a crystal glass tube which holds about one-half pint.

Ithen taste the milk to ascertain if the sample contains a large or small amount of cream, and by the lactometer the specific gravity of the sample is determined.

If I find the milk rich in cream, it readily accounts for its low specific gravity; if, on the other hand, the sample is poor and thin, I see at once that the specific gravity is reduced by the amount of added water. The lactometer for testing milk amounts to but little, except in the hands of persons of experience in its use; and even then it is questionable whether to have the sample analyzed by the chemist or not.

I may here observe, that in the enactment of laws in this State, in regard to the sale and conviction of venders of adulterated milk, the only evidence as to its adulteration admissible in our courts is a chemical analysis of the milk, with a sworn certificate by the analyst.

In closing this report, your Inspector would acknowledge the hearty co-operation of the Commissioners, Superintendent and officers of the Health Department, and also the kind assistance rendered by the officers of the courts.

I also make my acknowledgments to John M. Merrick, Esq., chemist for this office, for his ready advice and valuable services; and to private individuals who have interested themselves in the furtherance of the objects of this department.

Respectfully submitted,

HENRY FAXON,

Inspector.

No. 30 Pemberton Square, Boston,
March 31st, 1877.

[Document 33 —1878.]

CITY OF BOSTON.

~~THIRTEENTH~~ ANNUAL REPORT

OF THE

INSPECTOR OF MILK,

For the Year ending March 31, 1878.

To His Honor the Mayor and the Board of Aldermen of the City of Boston: —

Gentlemen, — Your Inspector respectfully submits the annual report of his office for the year ending March 31, 1878.

From the frequent mention of instances of the adulteration of milk in this report, some persons might be led to question the usefulness of the office of Inspector; as if, the work of adulteration still being carried on, the office was not doing its intended work of insuring to the community a supply of pure milk.

It is a sufficient reply to any such criticism to point to the violations of almost any, if not all, of the laws made to protect the public, and to prevent crime and punish the criminal; and to ask if, with the law and its enforcement, so much crime is committed, what would be the state of things with no law and, of course, no prevention of crime? What sort of milk would be furnished but for the fear of detection and punishment which the dishonest dealer is under by reason of the constant watchfulness exercised by the office of Inspector, and the certainty that the milk delivered at any place, by any dealer, may be put under an analysis, and its quality tested, and its impurity, if it be such, made evident?

This office has the means of showing the comparative purity of the milk now furnished, and of that supplied at the time the office commenced its work, and during any subsequent period; from which might be determined, approximately, the quality of the milk which, but for the direct work of the office and its influence, we should now be receiving.

At the beginning of my last year's annual report I had occasion to observe that the closing year had been an eventful and disastrous one to many of those engaged in the milk trade of Boston. Our average daily delivery of milk for that year was nearly 2,000 cans less than what it was during the last two or three previous years.

At the commencement of this year it was thought by those largely engaged in the trade that more favorable prospects for the future were in store for them. It has proved otherwise, however, and those most capable of estimating the daily consumption of milk in the city have further reduced the estimate 2,000 cans.

In many respects the milk trade throughout the year has been demoralized; the adulteration during the hot season was larger than it has been for the past two or three years.

The general summer price of milk was reduced 3 or 4 cents per can, which made but small difference to the consumer, but told seriously on the profits of the producer.

A very general feeling prevails with those who furnish milk for the market that they are but poorly paid for their time and outlay. We have abundant proof that some of them feel only slightly conscience-stricken so long as they are enabled to increase their profits 3 or 4 cents per can by the watering or skimming process.

The summer season is much more favorable for the successful prosecution of the milk business than any other portion of the year. The business has suffered severely, however, in common with other branches, from the prevalent industrial depression.

This year, more than ever before, the diminished milk trade of Boston has affected many of our milkmen in a manner which has not only brought ruin upon themselves, and great loss to others, but which has finally ended in causing the entire loss of their routes.

I refer particularly to the dishonest practice of enticing away the custom of other dealers by *underselling*. To enable them successfully to carry out their plans in this direction they are compelled to supply these places with milk for a price *less than is paid at the farmer's door*.

I may here observe that special pains is taken by this

class of milk-dealers on Monday mornings to collect the milk bill of the previous week; and, were it not for the vigilance of the contractors, very little of this money would reach their own or the pockets of the farmer.

Honest competition in any business is commendable; but when men resort to falsehood and deception to obtain trade, the sooner they are driven out of the business, and their places supplied by honorable, fair-dealing men, the better it will be for the community.

I am pleased in being able to bear my testimony to the fact that many of our stores, shops, and eating-houses, where milk is retailed, are conducted by men who are able and willing to supply their customers with a good article, and to pay their milkmen a remunerative price.

The laws of this Commonwealth relating to the sale and inspection of milk have not been changed since 1872. Our experience for the past few years proves the law sufficient to meet the wants of those who are disposed to avail themselves of its provisions.

The law provides that all inspectors of milk shall keep an office, and books of account, and record of all matters pertaining to the office. With these provisions of the law I have faithfully and strictly complied.

The general duties of the Inspector have been about the same from year to year; this year, however, has proved an exception; the unsettled condition of the milk trade and the increased amount of adulteration having had a tendency materially to change his duties for the season.

At the establishment of this office, in the year 1859, the city proper, with South and East Boston, contained a population of about 178,000. At that time it was thought by some to be the duty of the Inspector, in the course of the season, to visit and examine the milk in all places where the article was stored or kept for sale.

Although Boston has largely increased her territory and her population, which latter now amounts to more than 355,000, still your Inspector has been enabled to carry out the plan of a *general inspection* in stores and shops up to about the middle of last July.

At this time the hot season had commenced in good earnest, and our milk supply was very limited; consequently there was an increased amount of adulteration, and my services were in constant demand at not only the different milk stations, but in stores, shops, and eating-houses, and in private families.

To a considerable extent this state of things continued through the summer and fall months, so that the general

inspection was not resumed during the season, which may readily account for but little more than one-half of the usual number of milk examinations during the year.

In my general inspection of milk in former years about one-fourth part of the samples examined were found more or less adulterated; this year, however, my attention has been specially called to a large portion of the milk examined, on the ground that it was supposed to be *watered*.

Consequently in the 1,144 samples examined 457 were found more or less extended by the addition of water.

The milk-trade of Boston, as I stated in my previous report, is divided into two branches, for which separate sets of books are kept at the office of the Inspector: —

1. Wholesale dealers, who distribute milk to families, stores, etc., from carriages, or who keep more than one cow.

2. Retail dealers, who sell in small quantities from market places, stores, shops, and cellars.

Number of cows kept within the limits of the city of Boston: —

Number in the city proper	24
Number in the Dorchester district	578
Number in the Roxbury district	410
Number in South Boston	99
Number in East Boston	149
Number in the Charlestown district	22
Number in the Brighton district	159
Number in the West Roxbury district	288
	1,729

Number of persons who kept but one cow	510
There have been recorded the names and places of business of wholesale dealers in milk since last report	62
Whole number of wholesale dealers registered	1,776
Number of wholesale dealers now in the business	737
Number of wholesale dealers now selling from carriages	416
Number of small wholesale dealers who keep more than one cow, and sell to the neighborhood	327
Number of retailers in milk recorded since last report	12
Whole number of retail dealers recorded to date	2,428

Number of samples of milk inspected since last report	1,144
Number not adulterated	687
Number more or less adulterated	457
Number of cases analyzed by chemist	26
Average amount of adulteration in the cases analyzed	21.43
Largest amount of adulteration (water intentionally added in 100 parts), in the cases analyzed	42.05
Least amount of adulteration (added water) in the cases analyzed	7.42
Number of samples analyzed, including above and not adulterated	4.00
Whole number of samples of milk analyzed to date	442
Number of cases pending in the courts at the date of last report	None.
Number of complaints in the municipal courts	14
Number convicted in the municipal courts	13
Whole number of complaints in court to date	299
Whole number convicted to date	226
Whole number not convicted	73
Number of cases now pending in the courts	None.
Number of gallons of daily supply of milk for the city of Boston	27,400
Estimated daily cost to consumers	$7,124
Number of gallons for supply one year	10,001,000
Estimated cost to consumers one year	$2,600,260

The expenses of this office have been as follows, viz. : —

For the analysis of milk	$230 00
Stationery, record-books, advertising, printing, etc.,	107 10
Inspector's small bills for assistance, lactometer, and other instruments	26 75
	$363 85
For violations of the milk law there have been paid in the municipal courts, fines and costs amounting to	$442 55
One-half of the amount of fines has been paid to the complainants	$200 00

It will be observed that during the year a larger number of cases have been analyzed than there were complaints made in court. In some of these cases the amount of adulteration would not justify a complaint; in others, the analy-

ses were paid for by parties more directly interested, and did not come within the province of your Inspector; and a number of cases were against producers in the country, who extend their milk to be sold in this city; and, by the assistance of this office they were brought to justice there, and were more severely punished than they would have been in this county.

For general information on the subject of milk and its adulteration I incorporate in this report the existing laws of the State, and such matters as are of interest to the governments of other cities and towns, who are frequently seeking information from this office.

Extracts from Acts in Relation to the Sale and Inspection of Milk.

(*Acts* 1864, *Chapter* 122.)

Be it enacted, as follows:—

SECTION 1. The Mayor and Aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be Inspectors of Milk, for their respective places, who shall, before entering upon the duties of their office, be sworn. Each Inspector shall give notice of his appointment by publishing the same two weeks in a newspaper published in his city or town; or, if no newspaper is published therein, by posting up such notice in two or more public places in such city or town.

SECT. 2. The Inspector shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They may enter any place where milk is stored or kept for sale and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof, and cause the same to be analyzed, or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admissible in evidence in all prosecutions under this act.

The Inspector shall receive such compensation as the Mayor and Aldermen or Selectmen shall determine.

SECT. 3. [Repealed by Acts of 1867.]

SECT. 4. Whoever neglects to cause his name and place of business to be recorded in the Inspector's books, and his name legibly placed upon all carriages used by him in the conveyance of milk, before engaging in the sale thereof, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence, fifty dollars.

And whoever offers for sale milk produced from cows fed upon refuse of distilleries or any substance deleterious to the quality of the milk, or whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first and fifty dollars for every subsequent offence.

And whoever, in the employment of another, knowingly violates any provisions of this section shall be held equally guilty with the principal, and suffer the same penalty.

SECT. 5. It shall be the duty of the Inspector to cause the name and place of business of all persons convicted under the preceding section to be published in two newspapers printed in the town or county where the offence may have been committed.

SECT. 6. All act and parts of acts inconsistent herewith are hereby repealed.

[Approved March 30, 1864.]

(Acts 1872, Chapter 319.)

AN ACT TO PREVENT THE SALE OR EXCHANGE OF ADULTERATED MILK.

Be it enacted, etc., as follows:—

SECTION 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers to sell or exchange, adulterated mlik or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than twenty nor more than one hundred dollars; and for any subsequent offence, by a fine of not less than fifty nor more than three hundred dollars.

SECT. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalty provided in the preceding section.

SECT. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty nor more than three hundred dollars; and for any subsequent offence by a fine of not less than one hundred dollars, and imprisonment in the House of Correction not less than thirty, nor more than ninety days.

SECT. 4. Violations of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction, and one half of any fine paid shall go to the complainant.

SECT. 5. All acts and parts of acts inconsistent herewith are hereby repealed; but such repeal shall not affect any prosecution now pending.

SECT. 6. This act shall take effect upon its passage.

[Approved May 4, 1872.]

The following information, being useful from year to year, is inserted from my last report:—

The milk-cans used for the conveyance and sale of milk by the dealers are of two classes.

The large cans, which hold nine quarts and a pint, are in general use by the milk trade of Worcester county, and by many of those who collect their milk in the towns in the vicinity of Boston.

The smaller cans, which hold eight quarts and one half pint, are mostly in use on the Fitchburg, Lowell, and Eastern Railroads; and no milkman is considered equipped for business unless he is the owner of four or five full sets of cans, either eights or nines, as above described, sufficient to contain the milk necessary for his daily route; one set being in use while the others are on the way to the country for a fresh supply.

Many of the milkmen engaged in the family trade have several cans, holding from a pint to four or even six quarts, which they fill from the larger cans in quantities to suit their customers.

These small cans are, or should be, filled in the afternoon previous to their delivery the next morning, thus affording sufficient cream for family use.

We have a third-class-can, used by the wholesale trade, which holds

either four, six, or ten gallons, — sometimes more. These cans may be found at nearly all of the milk-stations, and they have come into use within a few years for the conveyance of milk to the butter and cheese factories.

The value of milk is determined by its proximity to a market. It will not bear to be transported like other articles of produce. "Railroad milk" is extensively used by city people, and in the hands of the railroad men is generally pure.

The milk supply of large cities has become an immense trade. At distances of 10 or 12 miles from Boston the milk is usually taken up by milkmen to be carried to the city in wagons, although there are several depots just outside the city, at which some of the dealers procure a part of their supply.

It is contended by those who think they know best that a milkman never gets rich at his business. City people, however, think otherwise; and have an idea that all milkmen lay up treasures.

The farmer who furnishes milk for market ought to make money for his labor; because he it is who has the largest investment of time and money in the business.

The cost of producing milk is much greater in the vicinity of large cities than it is at a distance. I have estimated the average price of milk in Boston this year to be about $6\frac{1}{2}$ cents per quart; and the prices in our shops, stores, eating-houses, and private families I think will justify this estimate.

The general price of milk has varied considerably during the past year from the price in former years, viz.: at the farmer's door, from 26 to 36 cents per can; and at the depots, in or near the city, after its collection and transportation, from 36 to 42 cents.

The milk is sold by the milkmen to stores, shops, eating-houses, etc., at from 45 to 55 cents per can; and is retailed in smaller quantities to families at from 6 to 8 cents per quart.

Thousands of cans of good milk have been retailed this season, from some of our stores and shops, at 4, 5, and 6 cents per quart.

This milk was often examined by your Inspector, and found to be of good quality. This fact, and the low price for which it was sold, would draw a large number of customers to the store for the milk, and, also, for other articles of family consumption.

The loss, whatever it might be, on the milk, would easily be made up by increased custom, and a cent or two advance

in the price of some other articles sold. It was often found that some of the best milk was retailed to customers for less than it cost at the depots.

It is evident that this state of things must not only bring loss to the milkman, but loss also to the contractor and the producer. The names of many of these milkmen who undersell have been seen during the year in the columns of the daily papers, under the head of embarrassed traders or firms.

April, 1877. — The Inspector commenced his duties, as in former years, in the inspection of the milk in stores and shops in the Roxbury District. The price of milk for the summer had been generally settled, so that the supply from the country was ample to meet all demands.

The reduction of two or three cents per can, however, from the winter price did not satisfy all those who raise milk for the market; as it was evident that in many cases the milk was grossly neglected, and not a few of the cans, when received at the milk stations, were found unfit for use.

To examine milk in stores, shops, and cellars, with any degree of satisfaction, requires clear, pleasant weather. In consequence of the lowery, wet weather, and other hindrances, the work of inspection was delayed beyond the usual time allotted to the part of the city above named.

By reason of the examination of milk at the office, or at private houses, days would often pass without any general inspection in distant parts of the city, the time for which work is very limited, as nearly all the milk in retail places is disposed of in the early part of the day.

The general supply of milk more than equalled the demand, so that but little adulteration of the article was found in the stores.

During this month some early morning-calls were made in this section of the city, and samples of milk were taken from some of the milkmen; and in all cases the article was found to be good family milk.

May, 1877. — The supply of milk from the country during this month was abundant, and upon inspection in all parts of the city proved unusually free from adulteration.

In the early part of the month, by request, I visited the milk stable of one of our large dealers in the Charlestown District, and examined a large number of cans of milk as they came from the cars, in 26 of which the milk was found badly adulterated.

A sample was taken from one of these cans and analyzed

by the city chemist, and was found to contain in 100 parts 29.36 of added water.

About the middle of the month an anonymous letter was received at this office, stating that at the Boston Highlands, at 5 o'clock, P.M., I could see a man selling pure, good milk, warm from the cow, at 5 cents per quart.

Thinking what a comfort this must be to the poor infant children of the neighborhood, I without delay visited the place, and found I was not kindly received by the mothers for my interference in the matter of their children's food.

A sample of this milk was taken and immediately analyzed by John M. Merrick, chemist, and it was found to contain less than 3 per cent. of cream, instead of 10 or 12, as there should be, and in 100 parts 31.19 of water intentionally added.

Whether the milk was any better for being mixed with *hot water* I was not informed by the chemist; our kind-hearted milkman, however, thought it was much more salable, and almost as acceptable to parents as that "*one cow's milk*," which has been so much desired and so long sought for in vain.

This hot-water arrangement did not please His Honor of the Roxbury Court, especially as the defendant had been introduced to him on a former occasion for extending his milk; and the court, for this offence, thought that $50 and costs would settle all demands.

The general inspection of the milk in stores and shops was at the north and west part of the city, where, this year, as in the two or three past years, the milk was with few exceptions found good. Some of the large retail places are supplied by our most valuable men, who are not often tempted to extend their milk.

I have found in this part of the city a number of bread and cake stores worthy of notice for always having good, pure milk to sell at a reasonable price. This desirable end is reached by the proprietor going directly to the milk-car, and obtaining his own supply, and always a few cans for others.

June, 1877, commenced with hot weather, which, however, did not continue long enough to create an unusual demand for milk; in fact, the whole month was very favorable for an ample supply, as the demand was limited, and the milk trade by all the dealers was considered very dull.

Still this did not prevent some of our dealers from extending their milk, as a number of them were called upon to settle their cases in court.

One of these cases was of more than usual interest, from the fact that it was contested against great odds, and resulted in a conviction and the payment of a large fine and costs.

This favorable result was reached by the professional skill of Alonzo W. Boardman, Esq., one of the Health Commissioners, who has often interested himself in the furtherance of the objects of this department.

The good result of this decision was plainly seen and felt during the season in the number of offending parties pleading guilty and paying fine and cost without the risk of a trial.

The retail milk depots in the different wards of the city are not so numerous as formerly; yet a number continue the sale of milk to be carried away, and, also, over the counter by the glass. This milk is obtained direct from the milk-station by the proprietor, who is pecuniarily interested to sell a good, pure article.

This month was devoted to the general inspection of milk in the stores and shops and in some private families of the Charlestown District. With few exceptions the standard of the milk was found as favorable as in any of the other sections of the city. The large number of places where milk was formerly sold, but which are now found closed, only confirms the fact concerning the depressed condition of all branches of business.

July, 1877. — The general inspection of milk this month commenced in the stores and shops in the neighborhood of Cambridge street. The supply at this time was sufficient for the wants of the people. As the month advanced the heat increased, and a few days wrought quite a change in the demand and supply of milk.

By the 15th of the month the demand for more milk was general in all parts of the city, and the necessity for an increase in the supply was plainly shown by the increased amount of adulteration, not only in stores and shops, but at the milk-stations and in private families.

My attention was especially called to a shop in the vicinity of the Boston & Albany Railroad. On visiting the place your Inspector found that two men were contending for the privilege of supplying it with milk. To accomplish his purpose each of them was proceeding on the underselling plan, viz., less than cost at the farmer's door.

The one, however, who left the milk on the morning of the Inspector's visit had greatly the advantage, as he was not only selling his milk at half price, but was increasing the intended profits by the addition of 40 per cent. of added water, as sworn to by the chemist.

This was truly an eventful can of milk, as the profits were again reduced by its owner paying a heavy fine and cost in one of our courts.

The other individual, by underselling and the constant enticing away of the trade of his brother milkmen, has not only ruined his own business, but sacrificed his route into the hands of others.

From the 15th to the 25th of the month the weather was very hot, and the supply of milk at all the stations was very limited; consequently the amount of adulteration was larger than at any other time during the season.

The 25th was a day to be remembered by the milk-dealers of Boston. The weather was extremely hot, and was very unfavorable for the keeping of milk, and but few could obtain more than one half of their usual supply.

A number of our dealers suffered severely by the milk pressure, and were obliged to pass through the courts and pay their fines and cost.

From the 25th to the close of the month the weather was cooler, and more favorable for a good supply. Even forty-eight hours wrought a wonderful change in the supply and demand.

August, 1877. — Although the weather the first part of this month was variable, yet there were not enough hot days to create an extra demand for milk, and the dealers were enabled to meet the wants of their customers, with few exceptions.

In this report (for the month of April) your Inspector mentions the fact that some of the dairymen were not satisfied with the summer prices paid for their milk.

Near the middle of this month it was found that two or three of these dairies were often tampered with, and were not forwarded to our market in good condition. One dairy, of from 8 to 10 cans, requires special mention, as it had been considered extra good milk, and was from one of our best Worcester County farms; and, on account of its excellent quality, was selected for the supply of one of our City Hospitals.

For some reason, however, this milk did not give satisfaction, and the Inspector was requested to investigate the matter. After visiting the milk-station a number of times it was thought advisable to visit the fountain-head of some of our milk supply.

Accordingly, on the 13th of the month, in company with one of the milk agents, the Inspector visited a number of our large dairy farms in Worcester County. In every place

visited the milk was examined, and, with one exception, was found to be good and pure.

This dairy of 10 cows was removed from the farm-house by the Inspector to the nearest milk-station, and examined, and every can was found to be largely extended by the addition of water. Two samples of this milk were analyzed by John M. Merrick, chemist, and found to contain in 100 parts, 42.05 parts of water intentionally added.

Complaint was therefore made in court, in the town where the offence was committed; and the defendant plead guilty and paid the usual fine and costs.

The latter part of the month the weather was dull and lowery, and our supply of milk varied considerably. Some days it was fully equal to the demand, while at other times it was impossible for the milkmen to obtain the milk needed for the daily supply of their routes.

September, 1877, with respect to the weather, was favorable for an ample supply of milk until about the 25th of the month, when, in consequence, it was said, of the dry weather our supply was seriously reduced.

There was not a day during the month but that some of our milkmen were *docked* of from 2 to 30 cans in their supply from the country. I may here observe that in former years it has been customary for the winter price of milk to be agreed upon between the producer and other parties during the month of September; and generally the price is advanced 2 or 3 cents per can.

This year, however, in consequence of the depressed condition of all branches of business, and for other reasons, this advance in the price was strenuously resisted, not only on the part of the milkmen and contractors, but, also, by many of the wholesale and retail dealers; and the month closed without any satisfactory arrangement being made.

October, 1877. — The Milk Producerss' Association of Worcester County was in conflict with the contractors, through whom the milkmen and consumers in this city obtain their supply of milk; the contractors and milkmen demanded summer prices for the winter, and, this being refused, almost all the local societies agreed to stop forwarding their milk on and after October 1.

Some did not do so, but enough did withhold their milk to make it scarce, and alarm the dealers concerning their future supply.

During this month your Inspector visited the Westboro' milk-station in this city, many times, and often found their

daily supply of milk had been reduced nearly or quite one-half in quantity. The milkmen were daily losing their customers for the want of milk; and it was evident that they must soon give up the contest, or sacrifice their routes to others more fortunate in obtaining milk.

About the middle of this month my attention was especially called to a store in the vicinity of Lincoln street, where milk was said to be retailed at 3 cents per quart. Under these circumstances the other dealers could sell but little; but they could, however, raise the old cry that "the cheap milk was more than half water."

This place was immediately visited, and it was found that their retail trade in milk amounted to 70 gallons per day, and that it was true that the milk was retailed at 3 cents per quart.

This milk came by express in 10-gallon cans, from the Deerfoot Farm, at Southboro', Mass., and was bought and sold to customers for skimmed milk. A sample of this milk was taken from a full can, and carried to John M. Merrick for analysis, which gave the following result: —

Specific gravity, 1.038; cream, 2.10.

Water	88.48
Solid matter	11.52
Total	100.00
Fatty matter	1.64
Caseine, sugar, and salts	9.88
Water	88.48
Total	100.00

Mr. Merrick says: —

Mr. Faxon, Milk Inspector: —

Dear Sir, — This is evidently a skimmed milk, but it contains 2.10 per cent. of cream. It must have been originally a very good milk, and, if sold for three or four cents per quart, I should think it would prove a great benefit to poor people.

Albert L. Murdock, Esq., of Jamaica Plain, in regard to skimmed milk, says: —

I desire to call attention to the fact that, as an article of food, skim milk is worthy of far greater consideration than has usually been bestowed upon it, and that the enormous amount of it produced in the

manufacture of butter and cheese is more valuable for consumption in towns and cities than utilized, as at present, solely in the feeding of swine.

I give herewith the average analysis of milk, skim-milk, buttermilk and cream, showing that, with the exception of the percentage of fat, skim-milk holds high rank in its nutritive qualities : —

	Milk.	Skim-Milk.	Buttermilk.	Cream.
Fat	3.20	0.55	1.67	35.00
Caseine	4.30	3.37	3.33	2 20
Milk Sugar	4.40	4.66	4.61	5.05
Ash	0.60	0.78	0.77	0.50
Water	87.50	90.64	89.62	57.25
Totals	100.00	100.00	100.00	100.00

The month closed with a limited demand for milk, which was favorable for many of the milkmen, who could not obtain one half of the milk necessary for their daily route.

November, 1877. — In the early part of this month the pressure for milk at the Westboro' station became irresistible, not only on the part of some of our citizens, but also of the milkmen who obtain their supply from this source.

One or more of the contractors was compelled to submit to the demands of the Milk Association.

The price of milk for which the Association had long been contracting was, viz. : —

At the farmer's door, 28 cents per can; at the depots in or near the city, 38 cents. This milk is sold by the milkmen to stores, shops, eating-houses, etc., at 48 or 50 cents per can, and is retailed to families at from 7 to 8 cents per quart.

The Association having carried their point with a few of the contractors, it was evident that sooner or later they must all (if the milk producers held out) come to their terms.

It was soon known throughout all the milk-producing districts in Massachusetts and New Hampshire that the Worcester County Association had not only carried their point in regard to the price of milk, but had also made satisfactory arrangements for a specified time in each month for the payment of all milk-bills.

The Milk Association of Middlesex County, and the milk producers generally, held frequent meetings to take measures to sustain the Worcester County Association in their action regarding the price of milk, and to obtain corresponding prices on all the routes.

The latter part of the month, in consequence of the advanced price, the supply of milk at the Westboro' station was sufficient for all demands.

At nearly all the other stations, however, the supply was very short, the producers being unwilling to forward their milk until the price was advanced.

December, 1877. — This was the pleasantest month of December on record. There was but one stormy day during the month, and only one day that frost gathered on the windows of comfortable dwellings.

On the 25th (Christmas day) cattle were grazing in the fields in the West Roxbury and Brighton Districts.

For reasons mentioned in my report of last month, our supply of milk at this time was very much reduced at nearly all the depots; and the general demand throughout the city was very limited, if compared with former times.

Less milk was brought to the office by private families for inspection this month than at any time previously during the season.

During January, February, and March there was but little demand for an extra quantity of milk. All through the winter months in some sections of the country the supply of milk exceeded the demand, and the oldest milk was first forwarded for consumption; so that when received by some of our families it was from two to four days old, and was in a few hours found to be unfit for use.

The remarkably mild weather this winter has been favorable for a larger supply than usual at some of the milk stations, while at others the demand more than equalled the supply.

These stations were often visited by your Inspector in the course of the winter, and it was found where the milk had been retained in the country it was because the winter price had not been advanced, as in most of the other milk-producing districts.

In consequence of the demoralized condition of the milk trade during the past season, as mentioned in the early part of this report, efforts have been made during the winter to form an Association, comprising the milkmen, milk-contractors, and, to a certain extent, the milk-producers.

The object of this Association is to determine the price to

be paid per can for milk at the milk stations and to the producers, and also to decide upon a uniform price to be paid at the stores and shops, as well as the retail price at which milk should be supplied to families.

It is considered by the Association necessary that none of them should sell milk at a reduced price, or either *steal* or *buy away*, or use any unfair means to obtain, the custom of others of their number.

Any misdemeanor or violation of the rules, whereby any of them suffer loss, is to be referred to a committee, and, if adjudged guilty, the offending party is to make proper restitution.

Whatever the effect of this Association may be, all that our citizens ask is that they may have *good* milk, for which they are willing to pay a fair price, leaving all difference of opinion as to profit to be settled between the milkmen and the contractor, and those who own the cows and forward the milk to market.

The following valuable information in regard to milk and its adulteration has been received from Mr. John M. Merrick, Consulting Chemist, of No. 59 Broad street, Boston.

He says, "In accordance with your request I send you a tabular statement of the results of the analysis of milk which I have made from samples furnished by you, commencing April 1, 1877.

Analysis, No. and Mark.	Specific Gravity.	Per cent. of Cream.	Caseine Sugar and Salts.	Total Solids.	Water.	Per cent. of added Water.
416	1.043	2.50	13.33	14.04	85.96	
417	1.022	8.00	6.57	9.66	90.34	29.36
418	1.027	8.00	8.61	11.35	88.65	7.42
419	1.022	3.00	6.40	7.75	92.25	31.19
420	1.020	5.00	7.59	10.09	89.91	18.39
421	1.026	6.00	7.01	9.95	90.05	24.63
422	1.024	7.00	7.54	9.93	90.07	18.07
423	1.021	12.00	6.60	10.95	89.05	28.18
424	1.024	5.75	6.81	9.07	90.93	26.78
425	1.022	6.00	7.19	10.00	90.00	22.70
426	1.024	5.00	7.11	9.65	90.35	23.56
427	1.024	5.50	7.30	10.08	89.92	21.52
428	1.025	7.00	7.88	10.23	89.77	15.28
429	1.021	5.08	6.91	9.17	90.83	25.70
430	1.017	5.00	5.74	7.74	92.26	38.29

Analysis No. and Mark.	Specific Gravity.	Per cent. of Cream.	Caseine Sugar and Salts.	Total Solids.	Water.	Per cent. of added Water.
431	1.019	5.00	5.67	7.40	92 60	39.03
432	1.022	21.00	9.37	16.25	83.75	
433	1.020	8.00	5.81	8.09	91.91	37.53
434	1.018	7.00	5.39	7.48	92.52	42.05
436	1.024	3.00	8.03	9.05	90.95	13.66
437	1.024	4.00	7.40	9.14	90.86	20.43
438	1.038	2.10	9.88	11.52	88.48	
439	1.023	1.75	6.82	8.49	91.51	26.67
440	1.023	8.00	6.48	9.04	90.96	30.32
441	1.028	8.75	7.70	10.63	89.37	16.46
442	1.029	7.50	9.40	12.22	87.78	
Average						21.43

"There seems to be but little to add to the above table. I have not found it needful to adopt any new method of analysis, or to modify that followed for several years past. There are, of course, more complete and refined methods, such as that of Pribram, but for our purposes they are needless, the process, which we owe in substance to Wanklyn, being sufficient. (I may mention, in passing, Bowery's method of determining the fat in milk (Chem. News, Vol. 35, p. 30) as apparently a very neat process.)

"The common notion that milk sours during thunder showers has never, to my knowledge, been made the subject of direct experiment until the present year. Dr. Iles, of Baltimore, has found that by filling a eudiometer-tube partly with skimmed milk, and partly by oxygen gas, and then passing sparks of electricity through the oxygen for ten minutes, the milk curdled very perceptibly, and showed a decided acid reaction.

"The contents of the tube, on standing twenty minutes, reached the consistency of ordinary sour milk. He concludes that the oxygen was converted into ozone, and thinks that this conversion may be set down as the cause of the rapid souring of milk during thunder-storms.

"Whether the ozone acts by giving rise to nitric acids, or, as Dr. Iles suggests, by the formation of lactic and acetic acids, the result is that the caseine is precipitated and the milk thickens.

"As connected with the analysis of milk, it may be mentioned that last year the Pharmaceutical Society of Leipzig gave a prize for a trustworthy method of butter analysis to Otho Hekner and Arthur Angell, English chemist. Six essays competed, two from Germany, two from England, one from Austria, and one from Italy.

"My attention has only recently been called to the fact that so excellent a book as Wagner's 'Chemical Technology,' in its eighth edition, has the time-honored statement that milk 'is sometimes adulterated with rice-water, bran-water, gum-solution, and *emulsion of sheep's brains*.' This last wonderful adulteration was fully commented upon in last year's report; and I may add here, that I will pay a very handsome reward to any one who will bring me a sample of milk offered for sale in this city, and adulterated with sheep's brains.

"It is not so widely known as it might be, that borax, or boracic acid, added in small quantity to milk, retards the separation of the cream, and preserves the milk for several days. A very trifling amount of oil of mustard added to cow's milk prevents coagulation.

"The mixture may be kept in summer for weeks in half-filled bottles without coagulation. In one experiment, after five to seven weeks, the caseine was found to be converted into albumen, and the liquid was strongly acid.

"The mere *coagulation* of milk, not its turning sour, may be prevented by citrate of potassia, chloride of sodium (salt), and certain alkaline salt.

"The following analyses of condensed milk, though not very recent, are of interest. The various samples contained from 25 to 36 per cent. of sugar and 14 to 18 per cent. milk sugar.

"Their further composition was as follows: —

	1.	2.	3.	4.
Water	22.18	18.82	22.42	18.18
Fat	12.26	12.62	12.03	13.65
Caseine and albumen	28.10	24.24	25.96	24.90
Ash (salts)	2.18	2.48	2.67	2.43

"These were all foreign (European) samples, and all, when mixed with four or five times their volume of water, yielded a good, sweet milk.

"The following pertinent remarks upon milk analysis are from a paper by Prof. Sharples, and are exceedingly just:—

The standard of 12.5 per cent. total solids has been chosen by many chemists, following Mr. Wanklyn in this respect. It is in all probability a little too low for this vicinity; but it has been adopted for the reason that the courts have generally ruled that, provided a milk dealer keeps his milk above the quality of the poorest milk that has ever been analyzed, he is to be regarded as selling pure milk, and is therefore not liable to conviction for adulteration.

The suit for adulteration being a criminal suit, and not a civil suit for damages, every advantage is given to the defendant, and the public is forced to be contented if the milk is as rich in total solids as the poorest milk of a half-starved cow was ever known to give. A much more just way would be to give in the law a certain standard, below which the solids in milk should not fall.

This might be even as low as 12 per cent.

It may be urged that milk being an uncertain animal product, dependent on various circumstances for its richness and strength, any one of which circumstances may at any time become abnormal, and so change the value of the milk; therefore, it would be unjust to establish any fixed standard below which the solids should not fall.

The answer to this is, that the milk of well-fed cows, in good health, rarely, if ever, falls below 11.5 per cent. of total solids, and that it will average over 13 per cent., and that by establishing the standard at 12 per cent., with a margin of one-half per cent. for exceptional cases, no injustice is done to any one.

"Further than this, it should be remembered, in passing judgment upon milk as sold in Boston, how highly improbable it is that the milk supplied from a certain can is all the product of one cow; and how unlikely it is that a herd of cows under ordinary care should give at one date an exceptionally poor milk.

"It cannot have escaped the notice of interested persons that occasionally juries are found who refuse to convict a defendant for adulterating milk, even when the chemical proof is so clear and positive as to admit of no criticism whatever.

"Careful preparation of the case by the inspector and chemist, a fair presentation of it by the prosecuting officer, and an impartial summing up by the court, all seem, occasionally, to be wasted.

"In this respect a rural jury is oftentimes very lenient. Such failures, however, do not lessen the obligation of the Inspector to watch carefully the condition of the milk daily supplied to a great city.

"Yours respectfully,

"JOHN M. MERRICK,

"*Chemist.*"

CHEMICAL ANALYSIS OF MILK FOR THE YEAR ENDING MARCH 31, 1868.		CHEMICAL ANALYSIS OF MILK FOR THE YEAR ENDING MARCH 31, 1878.	
Analysis Number and Mark.	Amount of Adulteration; added water.	Analysis Number and Mark.	Amount of Adulteration; added water.
No. 168	55.82	No. 416	. . .
169	40.70	417	29.36
170	32.56	418	7.42
171	29.07	419	31.19
172	19.77	420	18.39
173	45.35	421	24.63
174	40.70	422	18.07
175	17.45	423	28.18
176	25.59	424	26.78
177	36.05	425	22.70
178	26.75	426	23.56
179	23.75	427	21.52
180	48.84	428	15.28
181	27.92	429	25.70
182	24.42	430	38.29
183	62.33	431	39.03
184	20.94	432	. . .
185	37.21	433	37.53
186	26.75	434	42.05
187	44.19	436	13.66
188	13.96	437	20.43
189	18.61	438	. . .
190	23.26	439	26.67
191	27.91	440	30.32
192	29.07	441	16.46
193	19.77	442	. . .
Average	31.09	Average	21.43

The adulteration of milk and its detection without the delay and expense of a *chemical analysis* has, for the past twenty years, interested some of the scientific men of Europe; and has opened a wide field for a great difference of opinion on the subject of those engaged in the milk trade throughout our own country.

At the time of the establishment of this office — August,

1859 — the use of the lactometer, to ascertain the purity or the amount of adulteration in milk, was but little known.

The lactometer, in some parts of our country, has been thought sufficiently reliable to base a conviction upon its indications in a court of justice; the friends of the instrument have never contended that its use was of any consequence excepting in case of the adulteration of milk by the addition of water.

What we have to contend with here, as in other large cities, is the addition of water to milk, or the removal of the cream before offering the same for sale.

There are, and have been for many years, men largely engaged in the milk trade of Boston whose faith cannot be shaken in regard to the value of the lactometer as proof of adulteration.

For general information on the subject of milk and its adulteration and detection by the lactometer, as mentioned near the close of two or three of my former reports, I may be again allowed to incorporate in this report such matters as may be of interest, not only to consumers of milk, but to all those connected with the milk trade wherever situated.

During the past nineteen years I have used the lactometer to assist in the examination of more than 35,000 different samples of milk, from cows of various breeds, and with great variety in the kind of food and general manner of keeping them.

Whatever assistance the lactometer may be in the examination of a sample of milk, it will only approximate to the amount of added water, which may change the specific gravity of the milk. I say added water, because all, or nearly all, of our adulteration amounts to nothing more nor less than extending the milk with water. It is true, however, that many of our dealers in milk (especially in the city) dilute their milk with water colored with caramel, perhaps a grain or two in a pint.

This is not deleterious any more than molasses, but, still, an experienced eye will detect it at once, and by its presence we are led to suspect that the sample is more or less extended by water.

In all my examinations of milk I carefully observe the *color* after placing the sample in a crystal glass tube which holds about one-half pint.

I then taste the milk, to ascertain if the sample contains a large or small amount of cream, and by the lactometer the specific gravity of the sample is determined.

If I find the milk rich in cream it readily accounts for its low specific gravity; if, on the other hand, the sample is

poor and thin, I see at once that the specific gravity is reduced by the amount of added water.

The lactometer for testing milk amounts to but little, except in the hands of persons of experience in its use; and even then it is questionable whether to have the sample analyzed by the chemist or not.

I may here observe that in the enactment of laws in this State in regard to the sale, and the conviction of venders, of adulterated milk, the only evidence as to its adulteration admissible in our courts is a chemical analysis of the milk, with a sworn certificate by the analyst.

In closing this report your Inspector would acknowledge the kind assistance of the Health Commissioners and the Superintendent and officers of the Health Department.

He would especially mention the prompt service rendered by John M. Merrick, Esq., chemist, and also the services of the courts, officers, and private individuals who have interested themselves in the promotion of the objects of this office.

Respectfully submitted,

HENRY FAXON,

Inspector.

No. 30, PEMBERTON SQUARE, BOSTON,
March 31, 1878.

[Document 38 — 1879.]

CITY OF BOSTON.

TWENTIETH ANNUAL REPORT

OF THE

INSPECTOR OF MILK.

To His Honor the Mayor and the Board of Aldermen of the City of Boston: —

Gentlemen, — Your Inspector respectfully submits the annual report of his office for the year ending March 31, 1879, and the twentieth in consecutive order from the time of the establishment of the office, in August, 1859.

Since that date it appears, by a comparison of the early records and reports of the office with those of the present time, that by the increase of population, — partly by the annexation of neighboring communities, — the milk trade of the City of Boston has not only doubled in extent, but has also materially changed in many other respects.

The consumption of milk in all large places would show a rapid increase, if the pure article, as it generally leaves the dairyman's hands, could be delivered at the consumer's door.

The temptation to remove a portion of the cream, or to add water to the genuine product, seems too great for the average milkman to withstand, unless intimidated by the rigors of the law.

The production of milk for the supply of our own and other cities and large towns in Massachusetts has grown gradually, especially for the last few years, into an important and leading branch of industry throughout our own State, and has considerably extended itself in other States.

A large proportion of the milk supply of Boston and neighboring cities is received by the railroads centring in or near the city. From the commencement, milk agents have contracted twice a year with the farmers for their milk,

thus relieving them from the further care, except to receive the price agreed upon, once a month.

Milk collectors are employed by the contractors to collect the milk from the farmer's door, and deliver the same to the agent at the door of the milk car.

The agent remains on the train, in care of the milk, until its arrival at the depot in the city; and having received the milk account of his collector, and aided by the dairy-marks on the cans, he knows every can of milk in the cars, and from whom it came.

The milkmen, with their carriages, are generally at the depot ready to receive their milk on the arrival of the cars, each one receiving from the agent a sufficiency to meet the wants of his customers; for which milk the agent receives his pay once a month.

Some of this milk is distributed immediately, but a part of it is conveyed direct to the stables, and is packed in ice ready for delivery at an early hour the following morning.

This arrangement for a part of our milk supply has been in vogue many years. It can readily be seen that milk thus obtained must pass through many hands between producer and consumer, and its cost be thereby necessarily increased. Milkmen who receive their milk by the railroads on the contract system have always found it difficult to compete with other dealers who obtain their milk from other sources under more favorable circumstances.

The transportation of milk on the railroads (exclusively by milk contractors) has for the past few years been a cause of much complaint by the producers, — the latter claiming equal facilities for the transportation of milk with those for the conveyance of other freight; and to this end it is proposed by the milk producers of Worcester County to petition the Legislature to enact a law requiring the managers of railways to make provision for transporting milk from that section to Boston market.

It is evident, however, that in some of our milk-producing districts arrangements have already been made with the railway managers for a more direct and cheaper conveyance for milk. For the past two years, in my general inspection of the milk, I find that not a few of our large dealers receive their supply direct from the producer, without regard to either contractor or milk peddler.

Any arrangement that will bring producer and consumer nearer together will not only be of advantage to us in the quality of our milk, but some of the former profits can be divided between producer and consumer.

Another source of milk supply for the City of Boston is

from a class of dealers who live but a few miles from the city, and at night go through their neighborhood and collect a few cans in each place from small farmers; though some are supplied by quite large dairies. The price paid is such as the parties interested may agree upon, and varies considerably, not only at different seasons, but in the same season in different neighborhoods.

This class of milkmen are mostly engaged in the family trade, and as soon as their customers are supplied they return to their homes. Many of these men keep a few cows of their own, and, thus situated, are soon enabled to get up a good milk route, which they hold from year to year, and, sometimes from one generation to another.

The owners of these routes are enabled to supply their customers, summer and winter, at prices which defy competition. Many of our citizens much prefer the milk produced in the neighboring towns and brought in by these men, to the *railroad* milk, as it is termed.

By the annexation of adjoining cities and towns the number of cows within the limits of the city has been largely increased, so that the number is now about eighteen hundred. In some cases milk producers keep from two to a dozen cows, and supply their neighborhoods.

For the past two years, in consequence of the depressed condition of all branches of business, a number of our unemployed citizens, to assist them in the support of their families, have turned their attention to the keeping of a few cows.

In all the different districts of the city may be found persons who prefer the keeping of a good family cow to the using of milkman's milk, thus affording to their families rich, fresh milk at a much cheaper rate, and entirely independent of any of the milk-dealers.

The milk trade of Boston, as I have stated in my former reports, is divided into two branches, for which separate sets of books are kept at the office of the Inspector: —

1st. Wholesale dealers, who distribute milk to families, stores, etc., from carriages, or who keep more than one cow.

2d. Retail dealers, who sell in small quantities from market-places, stores, shops, and cellars.

Number of cows kept within the limits of city of Boston, 1805, viz.: —

Number in the city proper	18
Number in the Dorchester District	58
Number in the Roxbury District	450

Number in South Boston	100
Number in East Boston and islands in the harbor	181
Number in the Charlestown District	26
Number in the Brighton District	165
Number in the West Roxbury District	285
	1,805
Number of persons who keep but one cow	530
There have been recorded the names and places of business of wholesale dealers in milk since last report	63
Whole number of wholesale dealers registered	1,839
Number of wholesale dealers now in the business	800
Number of wholesale dealers now selling from carriages	435
Number of small wholesale dealers who keep more than one cow, and sell to the neighborhood	365
Number of retailers in milk recorded since last report	25
Whole number of retail dealers recorded to date	2,453
Number of samples of milk inspected since last report	1,213
Number not adulterated	862
Number more or less adulterated	351
Number of cases analyzed by chemist	28
Average amount of adulteration in the cases analyzed	16.61
Largest amount of adulteration (water intentionally added in 100 parts) in the cases analyzed	39.25
Least amount of adulteration (added water) in the cases analyzed	00.86
Number of samples analyzed, including above and not adulterated	7
Whole number of samples of milk analyzed to date	471
Number of cases pending in the courts at the date of last report	None
Number of complaints in the municipal court	10
Number convicted in the municipal courts	9
Whole number of complaints in court to date	309
Whole number convicted to date	235
Whole number not convicted	74
Number of cases now pending in the courts	None
Number of gallons of daily supply of milk for the city of Boston	28,256
Estimated daily cost to consumers	$6,216.32
Number of gallons for supply one year	10,313,440
Estimated cost to consumers one year	$2,268,956.80

The expense of this office has been as follows, viz. : —

For the chemical analysis of milk . . .	$210 00
Stationery, record-books, advertising, printing, etc., ...	77 71
Inspector's small bills, for assistance, lactometers, and other instruments	24 87
	$312 58
For violations of the milk law there have been paid in the municipal courts, fines and costs amounting to	$296 85
One-half of the amount of fines has been paid to the complainants	$125 00

At the beginning of my last year's report I observed that the closing year had been an eventful one to many of those engaged in the milk trade of Boston. There has been but little change for the better during the past year.

It is true that our estimated daily delivery of milk amounts to four hundred cans more than for the previous year; at the same time the price has been reduced equally with that of other articles of family consumption.

During the past season, and at the present time, stores and shops might be found in all parts of the city selling their milk at from four to six cents per quart, according to its quality.

This cheap milk is a source of much trouble to a class of our milkmen who have in years past been disposed to sell good whole milk and obtain therefor a remunerative price, whether it was through store trade or family custom.

There is, however, a large class of our citizens who obtain their family milk from these cheap places, preferring to patronize them because they get considerable more milk for their money. The *quality* of the milk thus obtained seems to be of trifling consequence, for we find the *skimmed-milk* places always thronged with customers.

During the general inspection of the milk in stores and shops the past summer, many of these cheap-milk places were found selling from eight to twenty cans daily; while at other shops, with good whole milk at a cent or two more a quart, it was found impossible to sell more than about one can per day, and some of this latter class of dealers have abandoned the sale of milk altogether.

Thousands of our Boston families obtain cream for their coffee from their milkmen by taking it from the top of a large can. This can is then filled up with common milk and

sold at a reduced price to the cheap-milk stores above mentioned. Those who wish to raise their own cream can do so by purchasing milk enough for the purpose.

It is a fact worthy of notice that a number of samples of milk have been brought to this office during the past year by the father of a family, saying "that he was ordered to do so by his family physician; alleging that the sickness in his family was caused by poisoned or adulterated milk."

In every case of this kind I have felt it to be my duty to procure an immediate analysis of the milk, as it is impossible to tell without an analysis what the condition of the milk is. I am happy to state that in the family above-mentioned the milk was not bought at any cheap-milk shop, but was obtained of their regular family milkman.

The sworn certificate of the analysis of the milk from these families was received from the chemist, and placed upon the records of this office. The chemist says, "I have made a careful analysis of these samples, and I find nothing deleterious to the quality of the milk." The chemist further states, "If this milk has caused sickness, I must say that I am unable to account for it;" and "I find these samples of milk to be considerably above the average standard of our Boston milk."

It is now nearly twenty years since one of our Boston milkmen visited New York, and on his return created quite a sensation by producing a French recipe for the manufacture of good, salable milk. It was then, and has been nearly every year since, said that thousands of gallons of this so-called milk was sold in Boston that did not contain one drop of genuine cow's milk.[1]

I can only say that after many years' search I have failed to find any of this manufactured milk, or any reliable person who has found it.

The mere denial of these sensational stories amounts to but very little; but when the public as well as the Inspector has on record the sworn testimony of such men as Hayes, Carney, White, Babcock, Merrick, and Sharples, we may well ask, Are these things really so?

The above-named gentlemen have analyzed nearly five hundred samples of milk for this office, and nothing more harmful than *water*, burnt sugar, and common salt, has ever been found.

These adulterations have been found in our milk for years,

[1] I see by one of our daily papers recently that some person has offered a dollar a quart for some of this manufactured milk. This office many years since agreed to pay a dollar for a *pint* of this milk to the identical man that brought this wonderful art to the knowledge of the milk dealers of Massachusetts.

and even with these adulterations our records show a steady improvement during the last ten years in the quality of our milk.

The contracts for our milk are made and the prices arranged according to the supply and demand by the dealers, three or four times in the course of the season.

The milk-cans used for the conveyance and sale of milk by the dealers are of two classes. The large cans, which hold nine quarts and a pint, are in general use by the milk-trade of Worcester County, and by many of those who collect their milk in the towns in the vicinity of Boston. The smaller cans, which hold eight quarts and one-half pint, are mostly in use on the Fitchburg, Lowell, and Eastern railroads; and no milk dealer is considered equipped for business unless he is the owner of four or five full sets of cans, either *eights* or *nines*, as above described, sufficient to contain the milk necessary for his daily route; one set being in use while the others are on their way to the country for a fresh supply.

Many of our milkmen engaged in the family trade have small cans, holding from a pint to four or even six quarts, which they fill from the larger cans to suit their customers. These cans are left within the houses, or at some designated place on the premises.

I have estimated the average price of milk in Boston the past year to be about five and one-half cents per quart, or one cent lower than for the year previous; and the general prices in our shops, stores, eating-houses, and private families will justify this estimate.

For a part of the summer season the prices of milk as agreed upon were as follows, viz., at the farmer's door, from twenty-four to thirty-four cents per can; and at the depots, in or near the city, after its collection and transportation, from thirty-four to forty cents.

This milk is sold by the milkmen to stores, shops, eating-houses, etc., at from forty-two to fifty cents per can; and is retailed in smaller quantities to families at from six to seven cents per quart.

During the months of April, May, and June, the general supply of milk more than equalled the demand. In the month of April the stores and shops in the Roxbury District were visited and the milk examined; the supply was abundant, consequently but little adulteration was found.

While in this part of the city my attention was forcibly called to private families in regard to their milk. In the course of this month a number of early morning visits were made to this section of the city, and samples of milk were

taken from some of the milkmen; and in all cases the article was found to be good family milk.

These early calls were continued from time to time throughout the season. Most of the complaints in regard to the milk this month have arisen from its being old and deficient in cream when left in stores and families. The general inspection of the milk in the month of May was in places at the north and west parts of the city, where, as in the two or three past years, the milk was, with few exceptions, found good.

The last few days of this month, however, were very warm, and one or more of the milk-dealers in this section were called upon to settle in court for extending their milk.

The Inspector's time during the month of June was devoted to the examination of the milk in the Charlestown District. About the middle of the month, as the weather became warmer, the demand for milk was more urgent.

The supply from the country, however, continued to increase, so as to be about equal to the wants of consumers.

The extensive milk depots in the Charlestown District were visited and the milk examined many times in the course of the season; and not a few samples from these places have been analyzed, and the analysis has been paid for by those more immediately interested.

July, August, and September, 1878. — The weather for the first of these months, the most of the time, was very hot, and our supply of milk from the country was very limited; consequently the amount of adulteration had largely increased.

At this season, however, many families leave the city for the country, which affords considerable relief to the milkmen, as it enables them to meet more liberally the wants of those who remain.

We always have during these three months more adulterated milk than at any other season of the year; so that the Inspector was obliged, as heretofore, to suspend the work of general inspection in stores and shops, and devote his time early and late to those dealers who make it a business at this season to extend their milk.

The month of August brought us more favorable weather for an increased supply of milk. A part of the time the supply and demand were about equal; but generally the milk-trade by all the dealers was considered very dull.

There is a certain class of these men who are never contented unless engaged in disposing of their extended milk, or in cheating some poor family in the removal of their cream.

Thus far during the hot weather but few complaints had

been made at the milk stations in regard to the quality of their milk; but on the 13th of August, at the Westboro' station, one large dairy of sixteen cans was found badly adulterated.

This dairy was immediately traced to the farmer's door in Southboro' by the Inspector, and two samples of the milk were taken in presence of the producer and brought to this city and analyzed by the chemist, and were found to contain in 100 parts *31.83 of water*, intentionally added.

The inspection of the milk was continued in different wards of the city throughout the month of September. The weather was cooler, and in all places visited the milk was found to be an improvement on the two previous months' supply.

October, November, and December. — The former month came in with cool, variable weather, with very little rain; but the season had so far advanced as to quiet all fears respecting any scarcity of milk.

On the first of October, the winter contracts and the advance price of milk usually commence; but at this time the supply more than equalled the demand. Considering the favorable prospects for the future supply of milk through the winter season, and the dulness of trade generally, the dealers consented to a further reduction of the price for the winter, two or three cents per can.

During these three months frequent meetings were held between the producers and the contractors of milk, in regard to its transportation and the price through the winter.

The Transportation of Milk.

The Board of Railroad Commissioners have given their decision in this matter, which interests the milk producers and dealers, as well as the railroads.

"The Clerk of the Board, in the presence of a number of milk contractors and railroad men, read the decision to-day, and it seemed to be well received by all.

"The commissioners say they would strongly recommend to the Railroad Corporation that they should, as soon as possible, resume their proper and legitimate functions of general common carriers as respects milk; that, as such, they should run their own milk cars and manage their own business, dealing directly with the general public, and neither turning their cars over to contractors, nor their business over to middlemen.

"It is understood that the contracts in regard to milk, both those between the corporation and the contractors, and

those between the contractors and the producers, expire and are renewed between the 1st of October and the close of the year.

"The commissioners do not at present propose to take any action in regard to the matter of complaint beyond making the recommendation to the Railroad Corporation."

At a meeting about the first of November, the Boston milk contractors agreed to pay the Westboro' milk producers for the nine and five eighths' quart cans twenty cents for October, thirty-three cents for November and December, and for January, February, and March twenty-five cents per can, averaging about two and one half-cents per quart.

During the months of November and December the grass fields and pasture lands were never in better condition for the setting in of winter. The sod was almost a green as in June; the extreme moisture of summer and autumn and the summer-like warmth of October had preserved the luxuriance and sustained the freshness of mowing and grazing fields to an unusual degree.

From the most reliable information that could be obtained, it appeared that the supply of milk during these two months was sufficient to meet the demand; and even at the anniversaries of Thanksgiving and Christmas the supply appeared sufficient, and but few complaints were made as to the quality.

In the closing months of this report, viz., January, February, and March, there was but little demand for extra quantities of milk. In February and March two or three storms obstructed travel and, to some extent, retarded our supply from the country.

The milk business has suffered this year in common with other branches from the prevalent industrial depression, which has compelled thousands of consumers to reduce their supply, and many of the poorer class to abandon its use altogether.

Before closing this part of my report I may observe that there are but few days in the course of the season but what milk is received at this office from private families. Sometimes this milk is supposed to have caused sickness.

There is no possible way to determine as to that matter, excepting by a chemical analysis of the milk. The law provides that this shall be the only evidence in our courts, with a sworn certificate by the analyst, as to its adulteration.

CHEMICAL ANALYSIS OF MILK FOR THE YEARS 1859 AND 1860.		CHEMICAL ANALYSIS OF MILK FOR THE YEARS 1861 AND 1862.	
Analysis Number and Mark.	Amount of added water.	Analysis Number and Mark.	Amount of added water.
No. 1	36.70	No. 39	12.91
2	46.98	40	24.42
3	22.10	41	32.56
4	32.04	42	27.91
5	34.70	43	40.70
6	22.06	44	32.56
8	22.10	45	25.59
9	19.77	46	43.03
10	40.70	47	24.42
11	23.26	48	69.79
12	22.10	49	46.52
13	58.14	50	39.54
14	34.89	51	26.75
16	44.19	52	47.68
17	34.89	53	43.03
18	30.24	54	43.03
19	22.00	55	20.94
20	31.36	56	30.24
21	36.05	57	33.73
22	16.28	58	00.00
23	34.89	59	16.00
26	24.66	60	31.09
27	40.00	61	31.09
28	31.40	62	32.56
29	48.84	63	23.26
30	36.63	64	30.24
31	33.73	65	25.59
32	44.77	66	25.59
33	22.10	67	23.26
34	29.07	68	34.86
Average amount of Adulteration	32.55	Average amount of Adulteration	31.30

There are many, both large and small, places kept in this city for the sale of skimmed-milk, to which reference has been made in the early part of this report. This skimmed-milk trade has been a source of much annoyance to those dealers who sell *whole milk* at a fair price.

Some of these skimmed-milk dealers are supplied direct from large dairies in the country, while others easily meet the demands of their customers by skimmed-milk bought of the milkmen who have extensive cream custom. Samples of this milk have been analyzed during the past year; one, however, will serve to show the character of all.

ANALYSIS AND RESULT.

Specific gravity, 1.037; cream, 1 per cent.

Water	89.67
Solid matter	10.33
Total	100.00
Fatty matter	00.13
Caseine, sugar, and salts	10.20
Water	89.67
Total	100.00

Pure skimmed-milk.
Water intentionally added, none.

JOHN M. MERRICK,
Chemist.

Mr. Merrick says: —

BOSTON, May 3, 1878.

HENRY FAXON, Esq., *Milk Inspector:* —

DEAR SIR, — This seems to be what you describe it on your card — a sample of skimmed-milk. When received by myself it was sweet and good, and if sold under its proper name, as good as this specimen, and not professing to be *whole* milk, I can see no objection to it. If the price is made right, it must benefit a large class of people in the city.

Yours respectfully,

JOHN M. MERRICK.

CHEMICAL ANALYSIS OF MILK FOR THE YEAR ENDING MARCH 31, 1869.		CHEMICAL ANALYSIS OF MILK FOR THE YEAR ENDING MARCH 31, 1879.	
Analysis Number and Mark.	Amount of added water.	Analysis Number and Mark.	Amount of added water.
No. 205	41.87	No. 443	16.88
206	43.03	444	21.20
207	45.35	445	18.56
208	34.89	446	25.27
209	48.84	447	00.00
210	44.20	448	13.00
211	51.17	449	12.37
212	27.91	450	. . .
213	53.49	451	. . .
214	15.14	452	.86
215	41.87	453	38.07
216	25.59	454	21.19
217	34.06	455	25.92
218	31.53	456	24.41
219	. . .	457	26.67
220	20.00	458	18.29
221	26.06	459	26.89
222	24.01	460	. . .
223	26.67	461	28.07
224	32.05	462	. . .
225	19.25	463	31.83
226	35.05	464	30.86
227	27.35	465	18.07
228	22.97	466	12.59
229	37.04	467	15.02
230	28.88	468	39.25
231	25.92	469	. . .
232	33.58	470	. . .
Average	32.06	Average	16.61

Analysis Number and Mark.	Specific Gravity.	Per cent. of Cream.	Caseine, Sugar, and Salts.	Total Solids.	Water.	Per cent. of added water.
443	1.026	8.00	7.78	10.39	89.61	16.88
444	1.026	5.00	7.60	9.85	90.15	21.20
445	1.026	6.00	7.79	10.18	89.82	18.56
446	1.024	6.00	6.95	9.26	90.74	25.27
447	1.037	1.00	10.20	10.33	89.67	. . .
448	1.026	5.00	8.09	10.37	89.63	13.00
449	1.027	10.00	8.15	11.00	89.00	12.37
450	1.031	8.50	10.21	14.30	85.70	. . .
451	1.029	7.00	9.12	12.25	87.75	. . .
452	1.028	7.50	9.22	11.94	88.06	00.86
453	1.021	4.25	5 76	7.75	92.25	38.07
454	1.024	6.00	7.33	9.29	90.71	21.19
455	1.024	5.25	6.89	9.04	90.96	25.92
456	1.024	8.00	7.03	9.59	90.41	24.41
457	1.024	5.00	6.82	8.88	91.12	26.76
458	1.025	4.00	7.60	9.21	90.79	18.29
459	1.023	5.00	6.80	8.21	90.79	26.89
460	1.033	6.75	9.65	11.66	88.34	. . .
461	1.022	6.25	6.69	9.92	90.08	28.07
462	1,030	8.25	9.30	12.74	87.26	. . .
463	1.021	4.50	6.34	8.51	91.49	31.83
464	1.018	5.25	6.43	9.44	90.56	30.86
465	1.025	5.25	7.62	10.88	89.11	18.07
466	1.027	5.00	8.13	10.03	89.97	12.59
467	1.027	7.00	7.90	10.45	89.51	15.02
468	1.020	3.90	5.65	7.65	92.35	39.25
469	1.029	8.00	9.43	12.38	87.62	. . .
470	1.029	8.80	9.62	13.00	87.00	. . .
Average . .	. . .	. . .	. . .	. . .	. . .	16.61

Chemical analyses of Milk for the year ending March 31, 1879. By JOHN M. MERRICK, Chemist.

BOSTON, March 15, 1879.

TO HENRY FAXON, *Milk Inspector:* —

DEAR SIR, — I herewith transmit to you the analyses of milk made by the late John M. Merrick during the past year. These analyses show that the milk is slowly but decidedly improving in character.

Of the analyses presented, Nos. 444 and 445 were made by myself early in the year. I would further call your attention to the successful effort that is being made to introduce skimmed-milk at a low rate into the city.

A sample of this analyzed by myself in October last gave the following results: —

Specific gravity, 1.034.

Sugar	5.20
Casein	4.41
Ash	.70
Solids not fat	10.31
Fat	.46
Total solids	10.77
Water	89.23
	100.00

These figures show it, at the rate at which it was sold, three cents per quart, to be a valuable article of food.

In closing I wish to testify in a few words to the worth of your and my departed friend, Mr. John M. Merrick. In him we have lost, not only an excellent chemist, but a warm friend, and one who was ever ready to do what he thought was his duty.

Respectfully yours,

STEPHEN G. SHARPLES.

This office contains the records of a larger and a more valuable collection of chemical analyses of milk than can be found elsewhere.

These analyses were made from milk received from all parts of New England, and the work was performed by persons who had spent much time in perfecting themselves in this particular branch of their profession.

The late John M. Merrick was first employed as the City Chemist February 10, 1873, since which time he has furnished this office with one hundred and sixty-seven certificates of the analysis of milk.

These different samples were from cows of various breeds, and with great variety in the kind of food and general manner of keeping them.

There is a large class of people throughout the State who are deeply interested in all matters relating to milk, either as producers or otherwise, and continually engaged in the milk business.

Persons thus employed are always upon the lookout, through foreign reports as well as our own, for all the latest

information in regard to milk, and for any new discoveries that are made from year to year.

When this report was commenced it was expected that some valuable information would be incorporated by Professor Merrick on chemical facts and other matters in relation to milk, its adulteration, preservation, etc.

By the very recent sickness and death of this gentleman we are deprived of much information which has always been eagerly sought after by those interested in the milk trade of Boston and throughout the State.

As I shall have no further occasion to refer to the professional services of Mr. John M. Merrick, I may be allowed to say that for the past six years our duties in behalf of the city have always been of a most friendly nature; and he will long be remembered for his prompt and careful attention to the analysis of milk, and for the personal kindness and courtesy that have marked the intercourse of these years.

For general information on the subject of milk and its adulteration, I may be allowed to incorporate in this report the existing laws of the State, and such matters as may be of interest to the governments of other cities and towns, who are frequently seeking information from this office.

EXTRACTS FROM ACTS IN RELATION TO THE SALE AND INSPECTION OF MILK.

(Acts 1864, Chapter 122.)

Be it enacted, etc., as follows: —

SECTION 1. The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of milk for their respective places, who shall, before entering upon the duties of their office, be sworn. Each inspector shall give notice of his appointment by publishing the same two weeks in a newspaper published in his city or town; or, if no newspaper is published therein, by posting up such notice in two or more public places in such city or town.

SECT. 2. The inspector shall keep an office and books, for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They may enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof and cause the same to be analyzed, or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence; and a certificate of such result, sworn by the analyzer, shall be admissible in evidence in all prosecutions under this act.

The inspector shall receive such compensation as the mayor and aldermen or selectmen shall determine.

SECT. 3. [Repealed by Acts of 1867.]

SECT. 4. Whoever neglects to cause his name and place of business to be recorded in the inspector's books, and his name legibly placed upon all carriages used by him in the conveyance of milk, before engaging in the sale thereof, shall forfeit twenty dollars for the first offence, and for a second and each subsequent offence fifty dollars.

And whoever offers for sale milk produced from cows fed upon refuse of distilleries or any substance deleterious to the quality of the milk, or whoever knowingly offers for sale milk produced from sick or diseased cows, shall forfeit twenty-five dollars for the first, and fifty dollars for every subsequent offence.

And whoever, in the employment of another, knowingly violates any provision of this section shall be held equally guilty with the principal, and suffer the same penalty.

SECT. 5. It shall be the duty of the inspector to cause the name and place of business of all persons convicted under the preceding section to be published in the newspapers printed in the town or county where the offence may have been committed.

SECT. 6. All acts and parts of acts inconsistent herewith are hereby repealed.

[Approved March 30, 1864.]

(Acts 1872, Chapter 319.)

AN ACT TO PREVENT THE SALE OR EXCHANGE OF ADULTERATED MILK.

Be it enacted, etc., as follows: —

SECTION 1. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than twenty, nor more than one hundred dollars; and for any subsequent offence, by a fine of not less than fifty, nor more than three hundred dollars.

SECT. 2. Whoever sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, as pure milk, any milk from which the cream or any part thereof has been removed, shall be liable to the penalty provided in the preceding section.

SECT. 3. Whoever knowingly sells or exchanges, or has in his possession with intent to sell or exchange, or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, shall for the first offence be punished by a fine of not less than fifty, nor more than three hundred dollars; and for any subsequent offence by a fine of not less than one hundred dollars, and imprisonment in the House of Correction not less than thirty nor more than ninety days.

SECT. 4. Violations of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction, and one-half of any fine paid shall go to the complainant.

SECT. 5. All acts and parts of acts inconsistent herewith are hereby repealed; but such repeal shall not affect any prosecutions now pending.

SECT. 6. This act shall take effect upon its passage.

[Approved May 4, 1872.]

During the winter of 1873 an act was passed by the Legislature, of which the following is a true copy: —

(Acts of 1873, Chapter 180.)

AN ACT CONCERNING THE PURCHASING OF MILK AND THE SIZE OF MILK-CANS.

Be it enacted, etc., as follows: —

SECTION 1. All milk-cans used by persons engaged in the business of purchasing milk at wholesale shall be sealed annually by the sealer

of weights and measures in the city or town where the purchaser resides, and no milk-can shall be sealed which does not contain one or more quarts, without the fractional parts of a quart, and the capacity of the can shall be legibly marked upon it by such sealer.

SECT. 2. When milk is purchased by the can, such can shall hold eight quarts of milk, and no more.

SECT. 3. Every person violating the provisions of the act shall be punished by a fine of not less than twenty dollars nor more than fifty dollars, one-half of which fine shall inure to the use of the complainant.

SECT. 4. This act shall take effect on the first day of July next.

[Approved April 14, 1873.]

For general information on the subject of milk and its adulteration and the detection thereof by the lactometer, as mentioned near the close of two or three of my former reports, I may be again allowed to incorporate in this report such matters as may be of interest, not only to consumers of milk, but to all those connected with the milk trade wherever situated.

The adulteration of milk and its detection without the delay and expense of a *chemical analysis* has, for the past twenty years, interested some of the scientific men of Europe, and has opened a wide field for a great difference of opinion on the subject on the part of those engaged in the milk-trade throughout our own country.

At the time of the establishment of this office — August, 1859 — the use of the lactometer, to ascertain the purity or the amount of adulteration in milk, was but little known.

The lactometer, in some parts of our country, has been thought sufficiently reliable to base a conviction upon its indications in a court of justice. The friends of the instrument have never contended that its use was of any consequence, excepting in case of the adulteration of milk by the addition of water.

There are, and have been for many years, men largely engaged in the milk-trade of Boston whose faith cannot be shaken in regard to the value of the lactometer as proof of adulteration.

What we have to contend with here, as in other large cities, is the addition of water to milk, or the removal of the cream before offering the same for sale. Whatever assistance the lactometer may be in the examination of a sample of milk, it will only approximate to the amount of added water, which may change the specific gravity of the milk. I say added water, because all, or nearly all, of our adulteration amounts to nothing more nor less than extending the milk with water. It is true, however, that many of our dealers in milk (especially in the city) dilute their milk with water colored with caramel, perhaps a grain or two in a pint.

This is not deleterious any more than molasses, but still, an experienced eye will detect it at once, and by its presence we are led to suspect that the sample is more or less extended by water.

In all my examinations of milk I carefully observe the *color*, after placing the sample in a crystal glass tube which holds about one half-pint.

I then taste the milk, to ascertain if the sample contains a large or small amount of cream, and by the lactometer the specific gravity of the sample is determined.

If I find the milk rich in cream, it readily accounts for its low specific gravity; if, on the other hand, the sample is poor and thin, I see at once that the specific gravity is reduced by the amount of added water.

The lactometer for testing milk amounts to but little, except in the hands of persons of experience in its use; and even then it is questionable whether to have the sample analyzed by the chemist or not.

In closing this report your Inspector would acknowledge the kind assistance of the Health Commissioners, and the Superintendent and officers of the Health Department, and others who have interested themselves in the furtherance of the objects of this office.

Respectfully submitted,

HENRY FAXON,
Inspector.

No. 30 Pemberton square,
Boston, March 31, 1879

[Document 62 — 1880.]

CITY OF BOSTON.

TWENTY-FIRST ANNUAL REPORT

OF THE

MILK INSPECTOR.

To His Honor the Mayor and the Board of Aldermen of the City of Boston: —

Gentlemen, — The annual report of this office for the year ending March 31, 1880, is herewith respectfully submitted.

The duties of the office were assumed May 1, 1879. The routine of the office, in inspecting milk and executing the laws regulating its inspection and sale, is: —

1. By inspection at office. The office is open to all who may wish to use it for complaint, information, or inspection of milk.

2. By personal inspection at depots, stores, and carriages.

The milk trade is classified by the office into: —

1. *Wholesale Dealers.* This includes all those supplying families and stores.

2. *Retail Dealers.* This includes those who sell at retail from shops and stores.

Separate sets of books are kept for each class of dealers. The name, residence, route, and amount of business of wholesale dealers are recorded; as also the name, street, and number of each retailer. A certificate of registry is given to each. These certificates are numbered successively on the

books; but the numbers are not required to be placed on the carriages of dealers.

A Book of Inspection is kept for the purpose of recording every sample of milk examined. Under appropriate heading are recorded the date of inspection, the name of person having in possession, the gravity, quality, color, and character of the milk, together with such memoranda as may be thought proper.

A Journal is kept, in which the daily general working of the office is recorded. While each portion of the business has its proper record, the journal is useful in recording an outline of work performed; and is referred to for minutes of daily occurrence which have no special place of mention.

A Court Record is also kept, in which is recorded the history and disposition of all cases of prosecution instituted by the office.

Book of Analyses. In this book is recorded all analyses of milk made from the establishment of the office. As an analysis is received from the chemist, it is transcribed in this book, and then filed, with such memorandum as the case may require.

All visits of inspection by the Inspector are entered in a book of memorandum containing the name, number, street, occupation, price of milk, and name of dealer supplying store. These are copied into the book of inspection.

Inspection.

The inspection of milk at office is confined to that brought from families, by dealers in stores, and by milkmen — the latter using the office quite freely. While the office is fairly visited, it could be more generally used by the public to advantage. The Inspector has no authority to visit the dwelling; and hence the consumer must visit the office if he would avail himself of its services. If the dealer is informed of a visit being made to the office he is very careful to prevent a second call. Very often he calls at office at once, and promises improvement. A visit to the office is one of the best means to secure good milk. If there is doubt or dispute as to quality, the office will soon settle the question, and do justice to all parties. The experience in this branch is peculiar. People will complain and suffer, and yet render no assistance to cure the evil of which they complain. There is little or no desire on the part of the public to prosecute dealers; the trouble and publicity seeming to deter them, and they simply change one dealer for another. The attention of the public is respectfully called to

this matter, and they will find a visit to the office profitable and pleasant. There is no charge for inspection; its doors are open during business hours, and its services always ready at public demand.

Stores.

The general inspection of milk is by personal visits to depots, stores, and carriages. The inspection in stores is made by taking the name, occupation, street, and number; the name of dealer supplying milk; amount of sale in cans; selling price, as also the price paid. The milk is then examined by taste, color, and gravity. These, with all the facts, are written in a memorandum book, to be transferred to Book of Inspection. Certain localities and stores require more attention than others; but the desire is to call upon as many as possible, and to place every section of the city under supervision. From the extended limits of the city, and the large number of places in which milk is sold, this supervision cannot be constant nor thorough. The sale of milk in stores has not only increased, but has also materially changed the character of the business, producing a class of dealers who supply stores alone. Formerly the business was confined to the milkman and the family. Now the stores occupy the leading position; and, besides adding another cost to the consumer, is no improvement to the public nor dealer; for, while the public suffer in quality, the dealer realizes little or no profit from the sale. Milk has been very generally used by the stores as a leading article to bring other business, or as an advertisement; and a very spirited competition among them has resulted in, perhaps, large sales, no profits, and very poor milk.

The number of stores in which milk is sold can only be estimated, for there are no actual figures from which it can be gathered. It may be variously estimated from four to six thousand places. Though the law requires all persons, before engaging in the sale of milk, to register in the Inspector's Office, scarcely any attention has been paid to its requirements; hence there are no records to give an estimate of numbers.

Carriages.

The inspection of milk in carriages is not so easily accomplished as it is in the stores. Milkmen supplying families serve their customers at a very early hour, and the work must be done rapidly. Their routes extend over a large territory, and it is often difficult to find them when wanted. The inspection must be made before all the milk is deliv-

ered; and to be effective in this branch of inspection implies early-rising and rapid transit. The method is to stop a carriage, take the name of owner or driver, select some portion of milk, at random, for inspection, and note it. Very often several cans may be tested. This must be done rapidly, for the dealer is always in a hurry, and there is no desire to inconvenience him in his work. This is the only method to ascertain the quality of milk furnished to families, except such samples as may be brought to the office. The importance of this inspection is therefore apparent, and it cannot be too often or rigidly discharged. Dealers supplying stores may be found on the streets at a later hour, and are more accessible for inspection. The number of dealers supplying the city probably numbers eight hundred, though it is difficult, for many reasons, to give the actual number. They generally comply with the law requiring registration; but, once registered, there are no means of telling how long they remained, when or how they went out of it. An annual registration would give accurate information, and would be an improvement over the present system. It would have another advantage, in bringing the dealer in more direct communication with the office, which would result in acquaintance and better understanding between both.

The inspection at depots is made immediately after arrival of train; this is made necessary from the fact that the dealers at once commence to take away the milk, and properly care for it until delivery. Every facility is afforded for inspecting, and is often done at request of dealer or contractor. The cars, with one exception, arrive during the forenoon, bringing the morning and evening milk of the day before. The contractor exercises a supervision, and the individual dealer also generally examines the milk procured from the contractor. The experience of these men readily detects any defect in the milk, and as each dairy is known by mark or name, attention is at once called to it, and it is very soon remedied. Many milkmen contract directly with the producer, and each one receives and cares for his own milk in the cars; the contractors having no control or care of it.

The inspection of milk is, for all general purposes, effected by the use of the lactometer, and by observing the color and taste of milk. For general purposes this is sufficient, and will indicate good or bad milk. In a prosecution the law requires a chemical analysis, and where prosecutions are intended, they are made by Prof. J. F. Babcock, or C. E. Avery. At times complaints are made that milk produces sickness, and persons often desire to have analyses made.

The office is always cautious in incurring expense, and uses its best judgment in the matter. A great deal of research has been given gratuitously by the chemists, and in no instance has an analysis been refused where the public interest required it. No analysis has been made during the year by reason of causing sickness. The public interest might at times require a free use of analyses, for the lactometer, taste, color, or judgment, cannot tell the ingredients of milk. It is also advantageous in establishing the constancy and standard of milk. Several important points have been gained by the analyses of the year, and are in striking accord with the investigations of the New York authorities, made the past year, to establish a standard for pure milk.

The work of the year was commenced by a general visitation of depots, stores, and carriages, for the purpose of ascertaining the mode of business and condition of the trade. A thorough examination resulted in the conviction that the business was in a very demoralized state, and needed a radical change. Adulterated milk was very nearly the rule, and the pure article the exception. The business was conducted in the same manner as in past years, and there was nothing new in methods, or influences, to cause a change in the quality of the milk. This condition of affairs was found to be the result of years of indulgence in unscrupulous competition, and contempt of law. It was found difficult to tell when, where, or how to commence the work of reform. The law was examined, authorities consulted, and early in the year prosecutions for violation of law were commenced. The cases were taken promiscuously, as found, without any previous knowledge of parties, and included all classes of the trade. Many of these cases were at once settled by payment of fines, while others were stubbornly opposed, and carried from court to court to final settlement. Cases were selected to test the law, the result of which, as interpreted by the court, proved the law inadequate to meet the end desired. In framing the law of 1872 it was thought to cover everything needed; but the action of the courts shows that if adulterated milk is to be driven from the market it must be improved, or another law enacted. A great deal can be done with the present law, but it requires great time and labor to accomplish it.

The prosecutions were continued, and resulted in causing the dealers to be more careful of law, and also to improve the quality of milk. Dealers have been forced to respect the office and the law, and thereby do justice to the public. This branch of duty consumes a large amount of time and

labor, and is exacting and delicate. There is great power and discretion in the hands of the Inspector. The class to be met and dealt with is numerous and influential. Every case presented in court may be ably defended, and the prosecution should have the means to care for its side of the case. There is no provision for this course. The Inspector is the complainant, and a delicacy has often been felt in being compelled to act as prosecutor also. The positions should be separate and distinct. The cases are brought in the Municipal Court, though they may be brought by indictment, and the trial may be tedious and protracted. In a prosecution an analysis of milk is necessary, and, as there is no standard of milk, expert testimony can be introduced to overthrow the case. In case of conviction the law requires the publication of the name of the offender, and is far more dreaded than the fine imposed. The law is the final as it is the most effective resource of the office, and should be effectively and steadily applied until offenders who will insist on imposing upon the public a worthless article of food are driven into honesty of dealing, or a change of avocation.

Owing to the construction of the courts as to the liability of drivers, and also the bearing of the law on owners, many cases were held back awaiting the results of trials in the Superior Court. As a result of these trials it was evident that conviction could not follow, and a large number of cases which would be governed by the principle ruled on, were suspended. The prosecutions would have been more numerous if conviction could have followed.

The supply of milk during the year has been fully up to the demand. For a few days during the summer and fall the supply fell off, but soon resumed the usual amount. There is a greater supply and demand for milk during the summer months than at any other portion of the year. The price of milk in the early part of last year was very low, and many farmers ceased raising milk. The rise in price of grain in the fall had a tendency to drive producers out of the business; for, at the low price paid for milk, it seemed impossible for them to raise it to any advantage. These causes produced for a time a scarcity of milk. The farmers also held back a quantity, and took steps to raise the price of milk. This being accomplished, the supply and demand soon adjusted themselves.

The price of milk at depots, from April to November, was twenty-seven cents per can. The price since November is thirty-three cents per can.

The price paid to farmers in the early part of last year

was from sixteen to eighteen cents a can. The price now paid is about twenty-five cents per can.

The prices paid by families have ranged from six to eight cents a quart, six cents being the average, though the price is generally higher in winter than in summer.

The dealers supplying stores have a sliding price, getting just what they can obtain; the storekeepers, in turn, doing the same. Stores were selling milk at all prices, from three to six cents a quart, and buying at prices varying from twenty to thirty-five cents per can, — very often below the cost at depot. The cost of milk in stores is now more uniform, and averages five cents a quart. There is also a marked improvement in every respect.

The quality of milk supplied to families is fully equal to what it has been in the past. This branch is spoken of elsewhere, and the difficulty of treating it is apparent. That it is all that it should be — pure and good in all cases — cannot be said with truth. Many dealers, no doubt, supply families with a pure article, and it is equally true that a great many more do the contrary. An improvement is needed here, as well as elsewhere, and none can aid it more effectively than the consumers. The family must look after its own interest, examine the milk, and, if need be, use the office to obtain their ends.

The condition of affairs in the stores is anything but satisfactory. They have paid no attention to law, and have engaged in the business as if the law had no control over them. The stores were in competition with each other, and made milk a leading article. Quality was no consideration. They made hard bargains with milkmen, for the purpose of selling cheap and poor milk. They were not imposed upon by the dealer, for, at the prices paid, they must have known the quality. Indeed, large numbers go from dealer to dealer, to buy cheaper; and there are dealers who are always ready to accommodate them. The result has been that the public has suffered in being compelled to purchase from such dealers. In certain localities families are, perhaps, not able to purchase in large quantity, or to properly keep milk, and hence buy at stores. The price of milk sold generally to the stores is far below that paid by the milkmen at depot, and is of the quality spoken of elsewhere. While the dealers are to blame for this in the first instance, the public should share a portion of it. They have encouraged the sale of cheap milk by patronizing, and going from store to store to buy a pint or quart of milk a little cheaper than elsewhere. Stores in which good milk was sold were deserted, and often compelled to sell the same quality as their neighbors.

To correct, in a measure, the condition of the trade in stores much time and labor were given to this branch. The law was explained, and to correct the opinion that no responsibility attached, prosecution was commenced with that class of dealers.

A pleasant interchange of opinion and visitation resulted in much good, and the desire to deal in a pure article is now generally expressed. As the result of this labor, the stores generally responded to the demand for an advanced price, and in turn advanced upon the public; the result of which has been to improve the quality of the milk sold. There is still a large field for improvement. It would be flattery to say that the milk trade is all right. To make it so requires constant and persistent labor, and the breaking up of years of habit. If the public will buy of stores, generally, they will do it at their risk; the more so if milk is sold at such prices as would bankrupt an honest dealer. The purchaser of milk should look after its quality as well as he does other articles, and pay a price to command a pure article. Neither dealer nor storekeeper can sell milk for less than six cents a quart, without either a loss or a fraud; some may sell at cost, and others below it, and the milk be pure; but the rule will be true. The milkman pays four cents a quart at depot; his time, labor, and capital are worth something; certainly two cents' profit, which on eight quarts would be sixteen cents, — forty-nine cents a can — six cents a quart to the dealer. The purchaser will do well to give a moment's thought to the subject, and if he is anxious to have good milk, govern himself accordingly. The dealers and public should know that the law protects milk, and admits of no choice, alteration, or adulteration whatever, having no standard but a pure article.

In the table of operations following, will be observed the number of retail dealers registered for the year as 192, and those of the year preceding as being placed at 25. The contrast is given to show the disregard of this requirement of law, and the labor devoted to this branch of the trade to make it what it should be, and to let dealers know that the law is not a dead letter, and that they must regard all its requirements.

Operations for 1879–80.

Number of wholesale dealers registered . . .	82
Number of retail dealers registered	192
Number of retail dealers registered 1878–9 . .	25
Number of visits made, and samples of milk inspected,	1,605
Number of samples analyzed	50

Number of samples analyzed, and not adulterated	7
Average amount of adulteration	16.2
Largest amount of adulteration (water added in 100 parts) per cent.	38
Least amount of adulteration	4
Number of prosecutions	32
Number convicted	22
Number defaulted (1 bonds sued)	2
Number not convicted (2 *nol pros.*)	8

Expenses of the Office.

For analyses	$395 00
" advertising	60 00
" printing and stock	46 76
" stationery	15 03
" inspector's bills, etc.	25 40
	$542 19

As a result of prosecution, there has been paid in fines and costs the sum of	$644 55
There has been paid to complainant, in accordance with law	$175 00

The law provides that one half of any fine imposed shall go to the complainant. While the intent of the law was to stimulate to activity, the provision was found to be injurious in the courts, by charging the complainant with mercenary motives. It has also been found to deter people from making complaints. The ordinance of 1859 made "fines and penalties, together with his salary," payable to the Inspector; and up to the present year they had been so paid, and the rate of salary was no doubt governed by them. A law of 1860 forbade the payment of fees "to any salaried officer," and early in the year the Auditor refused the allowance. The amount paid out was before action of the Auditor. I heartily concur in the change, for no officer should be placed in a position where his motives or labors might be impugned.

It would be a matter of much interest if the daily amount of milk consumed in Boston could be accurately known; but, as stated, there are no reliable means of ascertaining it. It can only be estimated. A former report of this office placed the

Daily supply of gallons at	28,256
Daily cost	$6,216

Number of gallons for year	10,313,440
Cost for year	$2,268,956

After a careful estimate from all sources, and full investigation, the amount might be stated as

Daily number of gallons	29,000
Daily cost	$6,960
Number of gallons for year	10,585,000
Cost for year	$2,540,000

In the daily amount is included the cream supply, and the value is placed at six cents per quart, which is a fair average, as prices range from five to eight cents a quart. The amount of cream sold in the city is quite large, and as the value is about four times greater than milk, the above estimate of value is not overrated. The value and volume are deemed reasonable, and would be below rather than above a fair estimate of the business.

Of the number of persons engaged in the business, and the capital invested, the same difficulty of arriving at conclusions is met. The number engaged in the business as milkmen, driving in carriages, is probably somewhere from eight hundred to a thousand. This number includes all those who own a few cows, and who sell their own milk. The capital invested is quite large, and the number of persons employed would probably reach eighteen hundred. The value of a route of forty cans, including teams, horses, cans, and custom, will range from two to three thousand dollars.

ANALYSES MADE DURING THE YEAR.

No.	Gravity.	Cream.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. water added.
1	1.026	10.00	12.51	4.32	8.19	87.49	. . .
2	1.025	4.00	10.77	3.32	7.45	89.23	13.84
3	1.025	6.00	10.60	2.63	7.97	89.40	20.00
4	1.026	3.00	9.61	2.04	7.57	90.39	23.01
5	1.034	5.00	11.41	Skim.	3.27	88.59	. . .
6	1.028	4.00	11.42	1.52	9.90	88.58	8.07
7	1.028	5.00	12.02	3.05	9.15	87.80	10.00
8	1.028	. . .	10.20	2.60	7.60	89.80	25.00

ANALYSES. — *Continued.*

No.	Gravity.	Cream.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. water added.
9	1.027	. . .	10.80	2.90	7.00	89.20	20.00
10	1.026	4.05	9.46	2.58	6.88	90.54	25.00
11	1.027	. . .	11.60	3.00	8.60	88.40	15.00
12	1.028	. . .	11.80	2.90	8.90	88.20	12.00
13	1.027	5.00	10.38	2.84	7.54	89.62	19.07
14	1.028	6.00	10.31	2.29	8.02	89.69	19.08
15	1.031	5.00	11.76	2.66	9.10	88.24	. . .
16	1.021	. . .	9.09	2.46	6.63	90.91	27.03
17	1.029	6.05	11.05	2.85	8.20	88.95	15.00
18	1.033	. . .	10.91	3.13	7.78	89.09	12.08
19	1.033	2.00	9.31	1.02	8.29	90.69	Skim.
20	1.031	2.00	12.80	0.72	12.08	87.20	Skim.
21	1.033	3.00	13.06	1.98	11.62	86.40	Skim.
22	1.030	8.00	13.80	3.60	10.20	86.20	Pure.
23	1.029	3.00	11.00	2.78	8.22	89.00	20.00
24	1.028	8.00	13.06	3.45	10.15	86.40	Pure.
25	1.025	7.00	10.87	2.82	8.05	89.13	22.36
26	1.022	6.00	9.83	2.56	7.27	90.17	29.78
27	1.027	6.00	9.96	2.56	7.40	90.04	28.86
28	1.028	5.05	11.22	2.61	8.61	88.78	19.86
29	1.025	4.00	9.61	2.17	7.44	90.39	31.36
30	1.025	7.00	13.40	4.99	8.41	86.60	4.29
31	1.028	7.00	12.60	3.79	8.81	87.40	10.00
32	1.028	6.00	10.20	3.00	7.20	89.80	25.00
33	1.025	. . .	10.60	2.20	8.40	89.40	20.00
34	1.029	10.00	13.94	2.77	11.17	86.06	. . .
35	1.022	6.00	8.17	1.74	6.96	91.33	37.09
36	1.028	6.00	11.31	3.11	8.20	89.69	19.02
37	1.028	6.00	8.67	0.41	8.26	91.33	38.00
38	1.029	6.05	13.43	3.41	10.02	86.67	Pure.
39	1.029	. . .	12.80	2.90	8.09	88.20	15.00
40	1.030	. . .	13.50	. . .	. . .	86.50	Pure.
41	1.026	5.00	10.73	3.08	7.65	89.27	23.04
42	1.028	4.05	10.39	2.85	7.54	89.61	25.79
43	1.824	8.00	9.02	1.92	7.28	90.80	25.00
44	1.027	6.05	14.64	4.32	10.32	85.36	Pure.
45	1.025	. . .	10.50	2.40	8.10	89.50	20.00

ANALYSES. — *Concluded.*

No.	Gravity.	Cream.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. water added.
46	1.025	7.00	9.44	1.95	7.49	90.66	32.57
47	1.025	10.00	12.55	4.74	7.81	87.45	19.02
48	1.026	5.05	10.52	2.40	8.12	89.48	25.00
49	1.031	9.00	14.07	4.42	9.55	85.93	Known to be pure when taken.
50	1.032	9.00	13.26	3.30	9.96	86.74	

The importance of the work committed to the care of this office will be better estimated as its labors become known. Our citizens are more or less dependent on it for the purity of an article which enters into the daily consumption of its homes, and which materially affects the health of the people. The question of food and its adulteration has occupied much public attention; and among the articles mentioned, milk has found a leading place. There is more than usual interest at present in the matter, both in city and country; for both are interested, the one by reason of health and comfort, and the other by interest. Owing to many causes the farmers are looking with new interest to milk production and supply. The farming interest is looking for new avenues to turn their acres to account. Cities are growing in territory, and filling up with thousands of earnest, prosperous life. The farmers are to supply these crowded centres of life with a great staple of food, perishable in its nature, but absolute in its need. It is a rich field for enterprise, and will tax its best efforts to meet the growing demand for a pure, rich, and nutritious article of food.

GOOD MILK.

Milk, as a food, is all-essential to man. It has all the requirements of a perfect food, and is to infant life its staff. Dr. Hassell, in his work on food, gives the following description of milk: "Milk is an opaque, white, yellowish-white, or bluish-white, bland, and slightly sweet liquid, having in general an alkaline reaction, and a somewhat variable specific gravity. When allowed to stand at rest for some time a stratum of a more or less yellow color collects on the surface, the portion below becoming of a bluish-white color, and of a higher specific gravity. This

stratum contains the greater part of the fat of the milk, together with a little casein, sugar, and water, and it constitutes the cream of milk. The composition of milk consists of water, holding in solution casein, albumen, lactose, or milk sugar, various salts, especially phosphate of lime, and, in suspension, innumerable fat globules, — water, fat, casein, sugar, ash, — water being the greater body in its composition." All authorities unite in saying that "milk contains all the elements necessary to the growth and sustenance of the human body, and is the only article supplied by nature which combines all the elements required to secure healthy nutrition in a form suited to the young animal." This is not only established by the composition of milk, but by the fact that persons have been sustained for a series of years, in health and vigor, by a milk diet. It is the food of young life, possessing all the elements which are required to give bone, muscle, and blood. Where this food is scant, poor, or impure, the young become feeble and puny, and, if reaching mature growth, will be wanting in vitality and life. The child is father to the man, and a feeble and impaired childhood can never give vigorous manhood.

The value of milk as a food being established, it is unnecessary to say that it must be a milk containing *all* the ingredients to make it a perfect whole; any adulteration changing its character, or making it entirely worthless. It must be rich, fresh, and sweet. Milk is very sensitive to its surroundings. The food of the cow is an all-important element in giving quality, taste, and color to the milk, and chemical changes are constantly taking place by foul air, filthy or impure water, damp or dirty dairies, and poor forage. Stale or old milk can be of little value as a food. It requires the utmost care to raise and send to a distant market an article which shall contain all the requisite qualities to make it a healthy, nutritious food; even the transportation is said to impair its quality. Upon arrival in the city the dealer must exercise care and judgment in its handling. Good milk may be made worthless by poor care, filthy vessels, or foul storage. To secure good milk, in the first instance farmers must have good animals, then give good feed, and plenty of it. They must pay attention also to their care and surroundings. They must have cleanliness, good light and air. The farmers know this, and seeing a growing opportunity and demand, are increasing their facilities, and paying more attention to quality as well as quantity. Indeed many milk producers are becoming well known for their products, the reputation

of which secures a ready and profitable sale. Emulation will soon set in, and it will be found that the best only will find a paying market. The farmers have claimed that it did not pay them to raise milk, and the prices obtained last year were certainly no great inducement to give special care, or rich feed, to their animals. The price realized last summer by the farmer averaged two cents a quart; the price of butter was correspondingly low, and the farmers seemed to have poor encouragement for their labors or products. It would not be surprising if, under these circumstances, the quality of the milk suffered, though not enough to call special attention or complaint. Affairs are now in a better condition, prices averaging three cents a quart at the door; and this, with the advance of feed, is claimed by them to be inadequate. But, whatever may be the price, there is but one way of producing good milk, and when that is furnished there will be no trouble between producer and consumer as to price.

The better to inform myself as to the quality of milk coming into the city, and to test its average standard and worth, several dairies in different parts of the State have been visited. There has also been brought to the office milk produced from different breeds of animals; their history has been taken, and the milk tested by gravity, cream, taste, color, and often by analysis. Almost every variety of milk has been sought out and tested by analysis, the best and poorest dairies visited and tested; and the result was always the same. Kind produced kind. Among several dairies visited two were of special note, and they but proved the perfection of country products. In one of these, fifty cows, of pure Jersey breed, were supplying Boston with a rich cream and milk. In another, a herd of one hundred — fifty Jerseys — were housed in barns, roomy, clean, well ventilated, and cared for by prudent hands; its products are celebrated, and find a rich market in our own and neighboring States, and its resources are taxed to the utmost to supply the demand. The milk of each cow is weighed, then removed to the dairy, where it is run through sieves for cleansing; then set aside to cool, and is then prepared for market. The dairy is quite distant from barns, and the milk is therefore free from all odors arising from them. Everything was in admirable order in both dairies, and showed the possibilities of good breed and feed, and proved that the standard of milk is easily ascertained, and is constant and sure.

Among other places visited were the city farms at West Roxbury and Deer Island. These were selected as a

specimen of the general dairy, or as an average farmer would care for his stock. The herd at Deer Island numbered twenty-five, and were a mixed herd. The herd were let out to pasture at seven o'clock in the morning, and brought to barn at five in the evening. The pasture is quite common, and the only feed given was corn fodder. The barn was roomy, well ventilated, and the air pure. The milk was removed from barn immediately after milking. No special effort was made to raise a superior milk. This herd supplies all the institutions on the island. The following is the analysis : —

Morning's Milk.

Specific gravity	1.032
Cream	9%
Total solids	14.07
Water	85.93
	100.00
Solids not fat	9.65
Fat	4.42
Total	14.07

Evening Milk.

Specific gravity	1.032
Cream	9%
Total solids	13.26
Water	86.74
	100.00
Solids, not fat	9.96
Fat	3.30
	13.26

These samples, while showing the average of milk, prove also the correctness of the standard in milk solids. All chemists have claimed that the solids of pure milk were

always reliable and constant; that, though the milk of a single cow might vary, the mixed milk of a herd should and would give a certain result, and that anything below that was impure. All analyses made by this office have proved the correctness of this position, and while many samples have been found ranging from the above result, up to sixteen total solids, none have been found below it. The cream in the sample is not high; for in a mixed herd it will range from 10 to 16 per cent., and in a Jersey milk as high as 35 per cent. The sample is shown to prove what an average herd will produce, and to show that there is no difficulty in finding and maintaining a standard of pure milk. The sample was selected as a fair representative of an ordinary farm, with no special care of breed and feed to aid the quality.

As a farther proof of the constancy of milk, and therefore of the need of a standard for it, it will be seen by reference to the table of analysis of the year that the few samples of pure milk all ranged up to this amount, while the impure went below it. The health authorities of New York have, during the past year, been engaged in testing the accuracy of the standard adopted by that city, and, after a careful and able investigation, have shown the wisdom of their course, and added another convincing proof of the constancy of milk. The New York standard by the lactometer is, in gravity, 1.029, and no milk below that standard is allowed to be sold. This is based on a mixed, or commercial milk; and at request of Dr. DeDay, of the Board of Health of New York, Dr. J. I. Isham examined the milk of 113 cows in Connecticut, and in his report says: "The standard as the minimum of pure milk is 10 per cent. below the average standard of milk as obtained by these tests, and discriminates in favor of fraudulent dealers to this percentage extent."

Poor, or Swill Milk.

Swill milk is the name generally applied to all milk produced from garbage, offal of table, or an entire feed of brewers' grains; as also an adulterated milk. It is used in this connection as poor milk, for, though a large amount of swill is disposed of in the city, there is no reason to suppose it to be fed to cows contributing to the city supply. If such feed were used, it could not long escape detection, for its odor alone would betray it. The term is often used also to describe the milk of dealers whose dairies are filthy, and whose animals are improperly cared for and poorly fed; and this latter description of swill milk is about the only article known to our citizens. To test some of this milk, and also

to judge of the appearance and condition of stall-fed animals, and examine the care and feed given them, several places were selected and visited. No notice had been given, and the barns were found in every-day working order. The surroundings were sufficient to indicate the character of the milk; for neither feed, breed, nor care, could overcome the taint of foul air, damp and crowded stalls, bad odors, and filthy exhalations.

The first place visited was a barn containing sixteen cows. There was no ventilation other than the doors; the air was hot and fetid, the place crowded, and rather dirty. The animals were examined and found healthy. They were in possession of the proprietor seven months. They were said to have pasturage; but it was very doubtful if they had any other than an occasional airing in a yard. The feed was brewers' grains and potatoes. The place was thoroughly examined, and at milking time a portion of milk was taken, tested by lactometer, and analyzed. The milk was sold to families in the neighborhood for six cents a quart.

In another place twelve cows were found in an old, dirty barn, standing on low, marshy ground. The animals were crowded for room; the ventilation was very poor, the place dirty, and a pile of manure on the outside contributed its quota to the sweet surroundings. Milking was going on in the barn, and receiving at the same time the odors of the place. The animals were healthy. The feed here was principally brewers' grains and potatoes. The owner confessed to buying refuse potatoes for feed, but fed only the good. A sample of the milk was taken. Improvements were urged, and were promised to be made. This milk was also sold to families in the vicinity.

In another barn fourteen cows were housed in a place the rear wall of which was about twenty feet high, and slanting to the front about ten feet. There were two doors, these being the only ventilation to the barn. During the day the animals range over a barren, swampy piece of ground, affording air and exercise, if nothing more. This place was found in a densely populated section of the city, the barn being surrounded by dwellings. The feed here was almost exclusively of brewers' grains. The animals were in excellent appearance, and were giving large quantities of milk. Milk was furnished to customers twice a day, a very large portion of it being sold on the premises. The place was fairly clean, the main objection being want of proper ventilation, sufficient room, and a more mixed feed. The milking was done in the barn, the straining being in the yard or house. The best of milk would soon become poor and tainted

by the surroundings. The local demand of milk was extensive; and, being furnished morning and evening, no time or care was allowed for properly cooling the milk, to remove the animal heat, before supplying customers.

It was claimed here, and elsewhere, that meal and hay were fed, but no appearance of either were present. The milk was sold in the neighborhood at six cents a quart.

These are a few instances among many which came under my notice. An improvement has been made in many of the premises, and, no doubt, in care and feed of the animals. The following analyses of two of these samples show the character of the milk: —

Analysis No. 1.

Specific gravity	1.023
Cream	8%
Total solids	11.94
Water	88.06
	100.00
Solids not fat	9.00
Fat	2.94
	11.94

Prof. Avery, in returning the analyses, says, "No test for blood. Bodies of irregular shape — some opaque, some transparent — are shown by microscope with one-fifth objective; as many as five were seen in one field of view. Odor of milk intense; became disgusting in twenty-four hours. After standing two weeks, the slight separation of whey shows the milk to resemble pure milk in this respect. The odor was that of potatoes."

Analysis No. 2.

Specific gravity	1.030
Cream	9%
Total solids	12.18
Water	87.82
	100.00

Solids not fat	8.48
Fat	3.70
	12.18

"No blood tests. Saw several round colustrum particles under one-fifth objective. Odor like fair milk, and not unpleasant. By standing, the whey separates out only to a moderate degree. It is plain to see that by no possibility could these milks be prosecuted as adulterated with water, yet the owners testified that cows could not live a year in their stables. The feed was very bad, —rotten potatoes and brewers' grains; the latter a little sour in stable No. 1, which was badly ventilated, and very dark. Diseased and badly fed cows are, then, not likely sources of the watery milk found in the city; these are due to adulteration, not accident. These results show the correctness of Wanklyn's view that milk, especially mixed milk, rarely falls below twelve total solids."

Other experiments in gravity, color, cream gauge, age, and odor, with the same kind of milk, produced the same result. The contrast between the last two and the first sample are instructive. The quality as a food, and the effect on health, of this last description of milk can be easily conjectured. Poor feed and poor care can never produce a milk fit for human use. There is no intent to discuss the question of brewers' grains as a proper feed for cows. There are those who think a careful and partial feed will produce good milk; and the result of the last two samples analyzed, as above, show that this feed, under the adverse circumstances surrounding them, does produce a milk far above the adulterated samples analyzed during the year. In the New York report, already alluded to, mention is made of this feed, "and that brewers' grains, when properly fed to cows, — that is, in a good condition, with proper admixture of meal, — gives good milk." Few will deny that this feed alone is injurious to the animal, and produces a milk not fit for use. In appearance this milk is thin and watery, its color a faintish blue, except when doctored, and an oily surface. The use of brewers' grains is perfectly lawful, and as the feed increases the flow of milk it is considered a profitable investment. A little attention would soon give a knowledge of this description of milk, when its use would simply become a matter of taste, for which the consumer would alone be responsible.

Colored Milk.

The public has heard much of late of colored milk, and it will doubtless be a surprise to many to know the extent of the practice. The use of colored or doctored milk is very general, at least in our city and its surroundings. It is an old custom, and the only surprise is that so little has been said or known about it. The public has been so long accustomed to this false article that it is now difficult to know the color of honest milk, and very rare to have the opportunity of looking upon it. Attention was first called to this matter by observing the milk as it came from the country, and then seeing a different color in the milk as sold. The secret was soon known. The milk was pure in the first instance, and doctored, or colored, in the other. Dealers make no secret of the matter; indeed many of them complain that they are forced into the practice by their customers, who insist upon the colored being the pure, and the white, the impure; and that they have lost customers by leaving a pure, uncolored milk. Nor is this surprising; for people have so long been accustomed to this color, and been educated to the belief that the colored, creamy, brownish milk is the only good article, that they turn with disgust from the whitish, bluish tint of the pure article. By turning to the description of milk, as given by Hassell, it will be found to be of a milky-white, or bluish tint; hence any liberty taken with it exposes the spoliation of cream or the addition of water, and its poverty is apparent in the thin, watery appearance and bluish tint which are inevitable in milk thus treated. The adulteration is easily seen, and hence the purpose of coloring, to conceal the fraud by giving an artificial richness and color to hide the bluish tint. It is very effective for the purpose, and has done its work well. Some claim that they color only to please the customer, and that no adulteration is practised; there may be such, but they are very few in numbers. The sole use of coloring milk is to deceive and mislead the customer, and, as such, its speedy suppression is desirable. With the aid of the public this is easily accomplished, for its detection is comparatively simple.

The law forbids this coloring, under the clause of "foreign substance," and wisely; for it acts a double part, — it adulterates, and then deceives. Whatever may be said of coloring, in the nature of excuse, is idle, for there is no excuse or apology for it. It is no excuse to say that it is harmless, because the materials of it are not injurious to health, and

that the color does not injure the milk, for the reason that the milk is comparatively worthless, and the color is to give it a false character, and thus impose upon the innocent.

The object of coloring is apparent. The general method of treatment is the following: the milk is first robbed of its cream, generally by a style known as "topping." A cooler, a vessel containing from ten to twenty cans of milk, is used as a general receptacle, and filled with milk. This mixes the milk of different dairies and makes it uniform. The gravity of the milk is then looked after, so as to balance the loss of cream; for, when cream is removed, the gravity runs up above the standard of pure milk. This is done by the addition of water, salt, and sugar; or the cream may not have been removed, and the milk has been "run," that is, watered to the extent of the judgment or conscience of the operator. Now the coloring matter is applied, the milk well stirred, and then drawn by faucet from the cooler, and the milk is nicely doctored, and in the morning promptly delivered to the consumer. This operation is generally performed in stables, with closed doors, and is more or less skilfully executed, according to experience.

The matter used in coloring is an old and staple article known as caramel, — burnt sugar or honey, — a very harmless thing in itself. Various other things are used, among others an article said to be very effective, and claimed as a new discovery; but it is neither new, nor an improvement over caramel. Annato is not much used, and if it were pure — for it is said to be often adulterated by poisonous matter — would be harmless. The coloring is very powerful, a teaspoonful coloring a can of milk. It is used generally in a diluted form, mixed with salt, for the double purpose of sweetening and adding to the gravity, and then added to the milk. Some will dilute with a quart or two of milk; others by mixing the color and salt together, and then regulate by the quantity of milk to be colored; three half pints of mixture coloring ten or fifteen cans of milk. The coloring is perfectly harmless to health, but demoralizing to milk. It is a cheat and a fraud on the public, and is never used but with that intent. It has been said by some that it improves the milk; but how, they fail to show. As to the difficulty of detecting coloring matter by analysis, none has been experienced by the chemists of this office, for it has always been noted on the analysis. There is no secret about it; its purpose is direct and plain; and, unfortunately, is all but common in its use. Some accuse the public for the responsibility of this; but very unjustly, for the dealers alone are to blame for teaching the custom in the first in-

stance, and continuing the cheat until it was almost impossible to detect or check it They have created a false taste and judgment, have reaped the benefit, and should be held to the responsibility. But while the public have not introduced the habit, they can very easily put a stop to it. Let the consumer take this matter of milk in hand. Seek a good dealer; inquire the source of his supply; examine the color of the milk; compare it with the natural. Do not take any milk that is colored; change the dealer if necessary, and at once consult this office; and a colored milk would soon be a rarity in Boston. Take no excuse of feed, breed, or any like subterfuge, nor one cow's milk, for it is a myth. The milk delivered in the city is a mixed milk, and should be alike in taste, color, and quality. If there is any dispute as to color or quality this office is always open to the citizens, and will be happy to aid in suppressing a custom fraught only with evil and fraud.

Skimmed Milk.

This article is assuming new proportions, and promises to become quite an item in the supply of Boston. The term has been variously applied to designate a milk wholly or partially denuded of cream, or a diluted milk. It is here spoken of as an article known to the law, allowed to be bought and sold, but under proper limits, and as a clearly defined product of the dairy. Skimmed milk, as the law speaks of it, is a milk from which the cream has been removed, thereby impoverishing the milk of its fatty matter alone. Thus deprived, the milk is still of value, possessing all the nitrogenous qualities except the fat. It is considered of great value to young animals; and cases are numerous where its use as a human food can only be taken in that form. A well-known authority says: —

"Skim milk differs from ordinary milk in containing a less quantity of fatty matter; it still contains nearly all the cheese, sugar, some butter, and the salts of milk; it is, therefore, scarcely less nutritious than new milk, but, in consequence of the diminished amount of fatty matter, is less adapted to the development of fat, the maintenance of respiration, and the temperature of the body. Where fatty matter is found to disagree, and where whole milk cannot be taken without inconvenience, skim milk may be used with advantage."

There can be no doubt of the relative value of skim milk as a food; but, to be of value, like whole milk, it must be pure, fresh, and sweet. It must be a skimmed, but not a

watered milk, for water destroys all its qualities; and this watered and colored skimmed milk is what has generally been known and sold in our market.

While this article is admitted to be of worth, I doubt if the article generally sold, owing to the manner of its preparation, is of any value; for if the skimmed milk was produced from "toppings," which is by turning off the tops of cans, water must be added to balance it; and if by the old and honest way of setting, and then skimming, the residue is deprived of the greater part of its value by reason of its age, being stale, affected by travel, odors, and changes before reaching the consumer. The greater part of the milk coming to the city is from twenty-four to thirty hours old before delivered to the consumer, and the process of setting, at least in some cases, would add to this time. The old method is not favorable for supplying a distant market with a fresh, pure skimmed milk. The new method of centrifugal force, by which the cream is removed in a few minutes, avoids this trouble, and saves hours in giving the consumers a pure, fresh milk. The milk of the morning, by this method, will be sent to market on the same day. Mr. Burnett, of the Deerfoot Farm, uses this method, and is now supplying the city with a large amount of pure, fresh, skimmed milk. The sources of supply are not numerous, and, if not enlarged, the amount of skimmed milk can never be a disturbing element in the milk trade. It comes generally from dairies making or supplying cream for butter, or by persons supplying a cream trade, as hotels, restaurants, ice-cream saloons, and some family trade. In the first manner, the supply is greater and more legitimate, for the milk is sold honestly. There are only three or four places — butter dairies — which send skim milk into the city; the rest is the product of the second class, and very little of it is sold as skim milk. Therefore, the amount of honest skim milk is not large; and, if sold as the law provides and at prices commensurate with its worth, will do no harm to the sale or use of pure milk, but, on the contrary, aid its use. A good skimmed milk, sold cheaply, would make a pleasant, healthy summer drink, and a nutritious food to many who could not afford a liberal use of a more costly article. During last summer a great deal of this milk was sold. The price of milk was quite low, and it was difficult to see much difference either in price or quality. Pure milk was advertised at very low prices, and upon inquiry the claim would be made that they were selling a skim milk, and of course were not amenable to law. The only knowledge the public had for protection was the price, and this was low enough to show

that it could not be a pure milk. If a skim milk is wanted, the public should see that it comes from a proper source, and is of a proper quality, for the real article is not too common in our city. Hereafter it must be sold in such a manner that the public cannot be so easily deceived. If it is to be used, see that it is the product of an honest dairy, white in color, unwatered and uncolored. The following analysis will show the result of a milk sold as pure, robbed of two-thirds of its cream, but fair in other respects: —

Analysis.

Specific gravity	1.033
Cream	3%
Total solids	13.6
Water	86.4
	100.0
Fatty matter	1.98
Solids not fat	11.62
Water	86.40
	100.00

The following analysis is of milk sold to families, and was taken from the team of a dealer. The cream could not be found. The sample was colored with caramel: —

Analysis.

Specific gravity	1.033-27
Cream	
Total solids	9.31
Water	90.69
	100.00
Fatty matter	1.02
Solids not fat	82.29
Water	90.69
	100.00

The value of this milk is apparent. The low solids of the

last show its worthlessness. Both were sold as pure. The first was good in everything but cream.

Milk Supply.

The city of Boston is supplied with milk mainly by the railroads, at least two-thirds of the supply coming by that source; the remainder being furnished by residents of the outlying wards, and by the surrounding towns. Very few persons have any conception of the means and magnitude of the milk business, or of the process by which their tables are daily supplied. Most of the railroads centring in the city have a milk-train, and the milk comes from Maine and New Hampshire, as well as from Massachusetts, our own State furnishing the greater amount. An impression is generally entertained that the milk left at our doors is brought by farmers from the neighborhood, little thinking that milk on the breakfast-table came from the centre of the State, or the fields of New Hampshire. This source of supply is a very important one, and is carefully and promptly conducted. It is the result of experience and enterprise, and deserves mention. The business is conducted by a class of men called contractors; these men contract with producers for their milk, twice a year, fixing prices, etc. They are to take the milk from the door of the farmers; employing persons who gather up the milk and load it in the cars. Each dairy is known by its mark, and the owner held responsible for its quality. The milk car is specially arranged for the business, being built in closets or sections, and is capable of carrying from five to fifteen hundred cans of milk. The milk is carefully handled, and in summer iced, and arrives in the city at different hours, and in good condition. Upon arrival at depot the milkmen gather, and each takes from his contractor the quantity to supply his customers. Some slight portion of the milk, as it arrives, may be delivered to consumers; the greater part, however, is not delivered until the next day. It is taken from the car and carried to the stable, where it is properly cared for until next morning, when it is delivered.

The contractors are few in number, though many milkmen are now making contracts directly with the farmers. They purchase from the farmer, and the milkmen purchase from the contractors. The contractors are responsible to the railroads. The milkmen furnish the cans, one set being sent to the farmer, while the other is in use; the empty cans being carried by the road to the milk supply. Until last year the contractors may be said to have had the monopoly

of carrying milk over railroads; and perhaps justly so, for the business was peculiar; but the law has now opened it to the public, and if milk is offered it must be carried like any other commodity. This will doubtless increase the supply and facilitate its delivery. Formerly the farmer had returned on his hands all milk which soured; and in turn the contractor had to take all the farmers' milk, whether he used it or not. By present arrangements the contractor takes only what he requires. There is a better understanding to-day, than ever before, between contractor and producer, the result of which will be in the interest of the public. The contractor is responsible for the purity of the milk, and looks after it sharply, returning at once any milk below the standard; and in turn the milkman at once reports to his contractor any deficiency he may find. The system seems to be a necessary one; is ably conducted, bringing producer and consumer as close as possible, and is one which it would seem difficult to improve. The milk coming on these routes is excellent, and very rarely is there any just ground of complaint. Indeed, it is the real milk, the best coming to the city, with the exception of a few dairies, and, notwithstanding the sneer of railroad milk, is the best source of supply. The distance is too remote from cities to furnish a cheap food, and the cows of the distant farms give to our people a pure, healthy food.

The only objection that can be urged is the age of the milk, — the best being twenty-four hours old when delivered, — but that seems unavoidable, at least for the present, though enterprise will find a way to improve, so that the milk of to-day will be delivered to-morrow, fresh and sweet, to the consumer. It would seem to be practicable on one of the roads, at the present moment, if the milkmen pursued a different method of business; simplifying it, by taking from the car, and at once supplying their customers with the milk just as it came from the dairy. The cars arrive about midnight, sufficient time to allow the dealers to load up and start upon their morning calls. As it is now conducted most of the milk is simply stored on the premises, or carted away during early day or morning, for next day's delivery. The growing demand for milk, and the increased revenue of the roads, will soon demand increased facilities, foremost among which will be trains specially timed for a morning delivery of milk, thereby securing a fresh as well as pure milk for our city, and enlarged income to farmer and dealer.

The other source of supply is by a large class of persons who come from towns accessible by teams for morning delivery in Boston, and by persons residing within city limits,

the latter being no insignificant number. The supply from towns within a radius of twenty miles of the city is quite important, and forms a very distinct class of dealers. Their method of business is somewhat different from the other branch of dealers, and there appears to be considerable rivalry, if not feeling, between many of them. The country supply claim that they can sell cheaper, as, buying from the farmer, they save the contractor's profit and railroad fare. This class of dealers generally "pick up" a trade, thereby encroaching upon the routes of others. The other class generally buy an established route, which is considered personal property, and is quite valuable. The dealer from the country supplies himself much as the contractor does, by making contracts with different farmers, and by collecting it from each dairy, in lots from one to ten cans, and bringing it to his barn for delivery in the city next morning. It is sometimes collected through the day by an agent, and by him delivered to his principal, whose barn is in the city. This class has one advantage, — the milk is generally not so old when delivered as the other class of dealers furnish. The farmers receive about the same price for their milk as those supplying the railroads. Much of the milk coming into the city from this source is of excellent quality, while much more is very inferior,— the poorest supplied. The reason is very evident; for the milk is the product of animals fed on substances which increase the quantity, but add nothing to the quality of the milk. A very large amount of brewers' grains finds its way to the neighboring towns, and is known to enter largely into the feed of cows, — oftentimes the only feed, — and every milk producer knows what kind of milk that produces. Hence this milk is avoided by those who know the difference, and this source of supply is tainted with its reputation. It is also claimed that many of these dealers represent themselves as farmers, or at least that the milk is the product of an honest dairy, and by that means secure trade. There is hardly a doubt that families patronize them under such delusion, and that such professions are at times made.

Of the amount of milk raised within city limits there are no data to furnish it. The amount must be quite respectable, for in a former report of this office it was stated that there were 1,800 cows within the city limits. Most of this milk is sold in the immediate neighborhood, though there are several dealers who have large routes at different points, and are solely supplied from this source. The quality of this milk can be judged by the same standard with the others; some excellent, more of it very poor. Where proper care,

feed, and attention are bestowed, no better milk is produced. A great part of this milk is not such as would commend itself on its merits, or taste and judgment would select.

Adulterated Milk.

There has been much said and written about this subject, and varied opinions exist, which are erroneous and misleading. The fears also entertained of injurious or poisonous matters are groundless; for though the books sometimes speak of various matters of adulteration, and of substances injurious to health, later writers, both in Europe and America, repudiate them, and fail to find any trace, in their examinations, of the presence of any other adulterant in milk than simple water and coloring. The past records of this office fail to show anything else, and the analyses of the year corroborate it. Indeed it would be difficult to adulterate with many of the substances which are popularly supposed to be used; take chalk, for instance, it would not assimilate, but be precipitated at once to the bottom. The public may set its mind at ease as to the danger of milk adulterants. Milk may become dangerous, may perhaps cause sickness; but it will be by reason of decay, filth, or many reasons other than adulterants. The general method of adulteration has been given under the various kinds of milk spoken of, and is by two methods, viz., abstracting cream, and adding water. The coloring matter is known to the law as a foreign substance, and is used to conceal the adulteration by the methods spoken of. This is the general method of adulterating milk, and is found quite effective without troubling science to find a better. Salt and sugar are used in adulterating: the salt to preserve, but principally to give solidity or gravity; and the sugar to sweeten, but mainly to add to the milk solids, or make up for sugar of milk which is abstracted by watering; for sugar is very constant in milk. A suspicion is extant, of late, that a fatty substance may be used to make up for abstracted cream, but it has not yet been found. It is thought that arrow-root may be used to give the froth which gives such satisfaction on the tops of cans; but a little cream will produce the same result. But as yet nothing has been found in the examination of this office to show any other adulterations than those mentioned; and while of themselves they are harmless, they become injurious by destroying all the food-qualities of the milk.

The adulteration of milk, by removing cream, is very generally practised, and when practised includes other adulterants. Water must be added. When cream is

removed from milk the gravity of the remainder is raised to a higher degree, being the same as skimmed milk; for cream, being the lightest, rises to the surface; hence water being added to reduce it to its normal condition. Two objects are here gained: the cream is taken and sold at a large profit, and the water added makes another profit. Then comes another adulterant, for water alone cannot hide the theft practised, and the color is used to perfect the deceit. It is not a difficult matter to detect adulterated milk. Its practice is too common, solely by reason of the public not exercising a watchfulness which is necessary to secure pure milk. The milk should be daily examined by taste and color. The cream quality is shown by the rich look of the milk, and its action on food. It is easy to test it also by setting for cream, and the amount of cream will show the quality of milk. An inch in depth of a narrow glass will give it about ten per cent., which all milk should give. The odor and taste of milk should be observed, and any difference from day to day noted. Milk will be found to be uniform, for it is a mixed, commercial milk; and when it differs from its natural condition it will be found to be artificial, and for a purpose which is not in the interest of the public. The dealer should always be held responsible, for he holds himself forth as a judge of the article, and a competent person to carry on the business; it being immaterial whether he delivers it as obtained or not, whether poor at the farm or on the team of the driver.

The Lactometer.

The lactometer, or hydrometer, is an instrument used for the single purpose of indicating the specific gravity of milk; and, however derided by some, is a useful and faithful instrument for the purpose. It will tell correctly the gravity of milk; and, knowing the standard gravity of good milk, the result is obtained by the test of this instrument. It is arranged for a temperature of 60°, and the reading is governed by that standard. The instrument is marked at the top 1.000 or 0, the gravity of water; and then downwards by degrees to 1.040, — the highest point to which milk will run. The gravity of pure milk ranges from 1.029 to 1.035. The instruments are numbered differently, though meaning the same thing, 20 indicating 1.035, a pure milk; others will take 100, and this indicates the same. There has been much diversity of opinion as to the usefulness of this instrument in detecting adulterated milk, but the weight of evidence is in its favor, and in some States is the sole evidence of conviction; while in Europe it is considered a standard. The

dispute arises from the fact that the instrument can be deceived, and that watered and doctored milk can be brought to the same gravity with pure milk. This is true. As an instance, if cream is tested by the lactometer, it will show about the same gravity with milk watered about 25%, say 1.024. If this is true, of what use is the lactometer? The instrument is not deceived in either case; if testing cream, it gives its gravity; so in a rich, creamy, watered, or skimmed milk; the operator is alone deceived. The person using the instrument must use judgment and intelligence; with these, and the lactometer, the character and quality of milk is, for all useful purposes, at once settled. If, in the instance of cream, the lactometer stood at 1.024, judgment and experience would at once distinguish it from the watered sample of 1.024, and the lactometer would not be accused of inefficiency. It is a valuable aid to tell the character of milk; for, however skilfully adulterated, experience will point it out.

The milk trade is admitted by all parties interested to be in a very unsatisfactory condition. Dealers and public are alike sufferers, though in different degrees; and as both should share a portion of the blame, so should both unite in bringing about a needed change. Though a marked improvement has been made during the year there is still needed further progress. The dealers are numerous and influential, and, like all classes of men, differ in character and mode of business; and while many of them would like to obey the law and elevate the business, many more would take every advantage, and thrive at the expense of others. As a class the dealers deplore the position, but are almost powerless to change it; their surroundings and circumstances chain them to old style and habit. If a dealer departs from old ways he meets at once the competition of the unscrupulous; and, lacking support of the public, he must succumb, or return to old habits. The public demand cheap milk, and the man who sells pure milk cannot compete with the one who sells it watered, and can find a ready market. Milk is too cheap to-day to allow a living profit, and pure, rich quality. An honest dealer must have a large business to allow much profit. A route of forty cans is considered large. Paying thirty-three cents per can of eight quarts, or four cents a quart, for his milk, the profits of the dealer, after deducting his time, labor, capital, and expense, is easily computed, and will be found very moderate. A profit must be realized somehow, and it is very easy to surmise where, under these circumstances, the adulterated milk comes from. Milk is sent to the city as low as the farmers can raise it; indeed, the greater number claiming that there is no profit in the

present prices. It is useless for the public to expect a pure, rich milk, at prices which cannot command it, and at the same time secure its quality. The dealer must have his living, and he yields to the daily demand of low prices, and gets his profits as he may, by skimming and watering to the desired point. For this he has no excuse to offer; he holds out to the public an assurance of a good article, and if it cannot be furnished at a given profit he should say so, or retire from the trade. The suggestion is thrown out for the reflection of the public, so that correct views may be entertained of the business, and thereby both sides of the question be better understood and sooner adjusted. The public can do much to bring about a reform in price and quality, by demanding a good milk, a respectable dealer, and paying a fair price; and this they are generally willing to do when having confidence in the dealer. The dealer must seek to bring back confidence, for the want of it has been the great trouble, both in price and quality. The impression is common that, no matter what the price charged, the milk is impure, and that the cheap is as good as the more costly. There have been, no doubt, grounds for the opinion, and the sooner the dealer, by fair treatment and manly action, removes it, the better it will be for all concerned. This course will not only bring about mutual satisfaction, but will largely increase the milk trade of the city; for there is no doubt that if the public were satisfied of the purity of milk, its consumption would be largely increased by making it a more general article of food. The dealers are a hard-working, industrious body, and while the public should require full measure, good milk, and ready service, they should be, and are, equally ready to requite it.

Since the preparation of this report a very important law has been enacted, and is now in force, which involves a radical change in the milk business. The requirement of an annual license for all dealers selling from carriages is a great improvement. Imposing a fee on all persons engaged in the sale of milk will result in more care on the part of dealers, and will be a revenue to the city. The penalties are more severe, and will have a salutary restraining influence. The difficulty of placing responsibility under the old law is removed, for now all parties are equally responsible for their acts, — the principal, for his agent, and the agent for his own acts. In establishing a standard for milk a great end has been attained. Aside from its scientific value it simplifies proceedings, and removes those legal and technical defences which have been so common and often effective. The fee to

complainant is wisely removed. The law is thought by its friends to be all that is required, and will certainly remove many of the obstacles encountered in my experience of the past year. The act is in addition to the laws already existing, and is as follows: —

(Chapter 209.)

AN ACT TO REGULATE THE INSPECTION AND SALE OF MILK.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows: —

Section 1. In all cities and in all towns in which an inspector or inspectors of milk have been, or shall be, appointed, all persons who convey milk in carriages, or otherwise, for the purpose of selling the same in such city or town, shall annually, on the first day of May, or within thirty days thereafter, be licensed by the inspector or inspectors of milk of such city or town to sell milk within the limits of the city or town in which said milk is offered for sale; and shall pay to such inspector or inspectors fifty cents each for the use of the city or town. The inspector or inspectors shall pay over monthly all sums collected by him or them to the treasurer of such city or town. Licenses shall be issued only in the names of the owners of carriages or other vehicles; and said licenses shall, for the purposes of this act, be conclusive evidence of ownership. No license shall be sold, assigned, or transferred. Each license shall record the name, residence, place of business, number of carriages or vehicles used, the name and residence of every driver or employé engaged in carrying or selling said milk, if any, and the number of the license. The licensee shall report to the inspector or inspectors any change of driver or employé which may occur during the term of his license. Each licensee, before engaging in the sale of milk, shall cause his name, number, and place of business to be legibly placed on each outer side of all carriages or vehicles used by him in the conveyance and sale of milk. Whoever shall sell or expose for sale from carriages or other vehicles, or have in his custody or possession, with intent so to sell, milk, without being first licensed under the provisions of this section, or shall violate any other of its provisions, shall, for the first offence, be punished by a fine of not less than thirty nor more than one hundred dollars; and for a second offence, by a fine of not less than fifty nor more than three hundred dollars; and for any subsequent offence by a fine of fifty dollars and imprisonment in the house of correction not less than thirty nor more than sixty days.

Sect. 2. All persons, before selling or offering for sale milk in stores, booths, stands, or market places, in any city or in any town in which an inspector or inspectors of milk have been or shall be appointed, shall register in the books of such inspector or inspectors, and shall pay him or them fifty cents for the use of such city or town; and whoever neglects so to register shall be punished for each offence by a fine not exceeding twenty dollars.

Sect. 3. Whoever by himself, his servant or agent, or as the employé of any other person, sells, exchanges or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, or any substance deleterious to the quality of the milk, or milk produced from cows fed on the refuse of distilleries, or from sick or diseased cows, shall, for the first offence, be punished by a fine of not less than fifty nor more than two hundred dollars; and for a second offence, by a fine of not less than one hundred

nor more than three hundred dollars, or by imprisonment in the house of correction not less than thirty nor more than sixty days, and, for any subsequent offence, by a fine of fifty dollars and imprisonment in the house of correction not less than sixty nor more than ninety days.

Sect. 4. Whoever, by himself, his servant or agent, or as employé of any other person, sells, exchanges or delivers, or has in his custody or possession with intent to sell or exchange, or offers for sale as pure milk, any milk from which the cream or any part thereof has been removed, shall be punished by the penalties provided in the preceding section.

Sect. 5. Every dealer who shall sell, exchange, or deliver, or shall have in his custody or possession with intent to sell or exchange, or deliver for himself or as the employé of any other person or persons, milk from which the cream or any part thereof has been removed, shall distinctly mark in letters not less than one inch in length, in a conspicuous place above the centre upon the outside of every vessel, can, or package containing such milk, the words, "SKIMMED MILK;" and such milk shall only be sold in or retailed out of a can, vessel, or package so marked. Whoever violates the provisions of this section shall be punished by the penalties provided in section three.

Sect. 6. Any inspector of milk, or his servant or agent, who shall wilfully connive at or assist in any violation of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than one hundred dollars nor more than three hundred dollars, or by imprisonment not less than thirty nor more than sixty days.

Sect. 7. In all prosecutions under this act if the milk shall be shown upon analysis to contain more than eighty-seven per centum of watery fluid, or to contain less than thirteen per centum of milk solids, it shall be deemed for the purposes of this act to be adulterated

Sect. 8. Violations of this act may be prosecuted by complaint or indictment before any court of competent jurisdiction.

Sect. 9. Each inspector shall cause the name and place of business of all persons convicted of selling, or having in possession with intent to sell, adulterated milk, to be published in two newspapers in the county in which the offence was committed.

Sect. 10. Each inspector shall cause this act to be published once in a newspaper printed in the county in which he resides.

Sect. 11. All acts and parts of acts inconsistent herewith are hereby repealed, but such repeal shall not affect any prosecution now pending.

Sect. 12. This act shall take effect upon its passage.

[Approved April 22, 1880.]

The milk trade of the city will be seen to be a very important branch of business, in a pecuniary point of view, and is daily growing in value and volume. The importance of a pure, rich milk to residents of a crowded city is admitted by all, and efforts to secure that end cannot be too strongly urged or commended. To this office is committed the oversight, and, in a measure, the care of this interest, and it is a duty to point out its means and opportunities for performing the work. The restraining power of the office is influential, and has resulted in great good to the public; but the office has not reached out to its fulness, and is not up to the requirements of the interests committed to it. The

city has grown in territory and population, but the office has remained — with a single exception — the same as when established in 1859. It is apparent that with such interests to guard, and labor to perform, increased facilities for discharging it should be afforded. The duties of the office are exacting and trying; the hours of labor unusual and uncertain, and the territory to cover, wide and distant. With his entire time devoted to the work, the best efforts of the Inspector can but partially carry out the intent of the law, or protect the public from imposition and wrong. If the full intent of the office is to be carried out, and the work faithfully and thoroughly performed, increased assistance should be afforded, and the office placed in the position which its work and importance demand. Submitting, gentlemen, to your judgment, I could not, with justice to myself or the public, fail to call your attention to the subject, and to concur with those recommendations in the Inaugural Address of His Honor, pertinent to the matter.

It is a pleasure to record the interest manifested on this subject, by all classes, and grateful to acknowledge the sympathy and support of every official with whom my duties have brought me in contact.

Respectfully submitted,

MARTIN GRIFFIN,

Inspector.

30 Pemberton Square,
March 31, 1880.

[Document 51 —1881.]

CITY OF BOSTON.

TWENTY-SECOND ANNUAL REPORT

OF THE

MILK INSPECTOR.

To His Honor the Mayor and the Board of Aldermen of the City of Boston: —

Gentlemen,— The annual report of this office for the year ending March 31, 1881, is herewith respectfully submitted.

The year has been marked by a radical change in the law regulating the inspection and sale of milk. The law of 1880 was enacted in sound policy, and is daily proving its worth. Like all laws, however, it has to stand a certain strain, and it is now passing through an ordeal which, it is hoped, will result in a final triumph. The law made quite a change in the routine of business, both to dealers and the office. The law required an annual license, and, as it was published on the 27th of April, but little time was allowed to prepare books and issue licenses, to be dated from the 1st of May. The time of the office was mainly consumed for two months in the work of issuing licenses, and answering the thousand questions proposed by the dealers. The most valued object in requiring annual license is to bring the dealers in direct communication with the office, thereby becoming better known to each other, and the occasion was used to its full extent. While a general dissatisfaction was expressed against the law, there is now a better feeling in regard to it, and a large class see in it their only hope of future welfare. The provision of law requiring annual license has been very generally observed, and has been most salutary in its influence.

The new law has had an important influence on the milk traffic. The penalties are more severe than in any former law, and the imprisonment clause, which *may* follow a second and *shall* a third offence, is considered a strong precaution against adulteration. The most important section of the law, however, is that which makes a standard for milk. Heretofore a vast amount of time and labor was consumed in the courts as to the quality of milk, and if a milk, however poor, came once from a cow, it was urged upon a jury that the case they were trying might be the same. Now, if the analysis be proved correctly done, and if the milk be below the standard, "it shall be deemed to be adulterated." In prosecutions during the year the importance of the standard has been demonstrated. The influence of the law has been satisfactory, and those interested think that, however it may be opposed for a time, its success is assured.

The number of prosecutions has not been so numerous as in the past year. It was thought prudent to move slow and sure, as evidence was not wanting that a formidable combination among a certain class of dealers was in existence to thwart and fight the law; hence great care and judgment were necessary to prepare cases for trial. Much time is consumed in this branch of labor, and, if attended to at the cost of other branches, the public interest would suffer. Hence it was thought necessary for the protection of the public to devote a portion of time to early morning visitation, and examination of stores, thus making dealers cautious as to the quality of their milk.

In most of the prosecutions of the year the law has been opposed by the trial of cases in the municipal courts; and when, as has been the rule, they have been convicted, have appealed to the Superior Court. In two cases tried in the March term of the Superior court, which resulted in conviction of the parties, — one for assault and resisting the Inspector, — exceptions have been taken to the Supreme Court, to test the constitutionality of the law. There are other cases pending which it was thought best to await the action of appeal to Supreme Court. If the law be sustained, the last hope of those who violate its provisions will vanish, for they must live up to its requirements or suffer its penalties.

The supply of milk during the year has fully met the demand; indeed, with the exception of a few days, the demand has been below supply. This is accounted for by the cool weather of the summer and fall. The winter experience has been in keeping with past years, — a falling off of consumption; though it is said the exceptional cold of the winter has caused an additional loss to dealers.

The Price of Milk.

The price of milk has been higher this year than it has been for several years past. The price by dealers to contractors at depots, from April to November, was thirty-three cents per can, each can containing eight quarts and a pint. In November, the price was raised to thirty-five cents per can, and has remained at that price since. The price was made by action of the Association of Milk Producers, — the men who supplied the contractors. The dealers were quite uneasy about the price, thinking it too high, and that they would be unable to obtain an advance from their customers. Their fears proved groundless, and there is now a more uniform price, a better article, and less improper competition than under the old system. The united action of producer and dealer in getting a better price for milk, has resulted in placing a better article in the market, by at least reducing the temptation to impair it.

There is little probability that the price of milk will go much below its present standard, though there is at present a conflict between the producers and contractors as to price. The producers, represented by their Association, demand that the selling price by contractors, at depot, shall be thirty-three cents per can, while the contractors insist upon a selling price to milkmen at thirty cents per can. The interest of the producer in the selling price of contractors is, of course, in the difference which he would receive for his milk; while the interest of the contractor is to have his usual profit, and at the same time to give the retailer, or the milkman, his share of profit. The milkmen are endeavoring to settle the price of milk, during the summer, at six cents per quart, and are looking with interest to the contest, for the difference is, to them, a factor in their profits. The present retail price of milk is from six to eight cents per quart, seven cents being very generally charged. The milk producers claim that milk cannot be raised at profit at less prices than now charged; and if they maintain their position, the contractor and milkman must add their profits; and the price of milk is settled on that basis, and will be governed by the law of supply and demand. It is to be hoped that all parties in interest will be governed by a broad spirit, so that this indispensable article of food may be placed at such a fair price as will increase its consumption among our people.

The milk trade in stores has decidedly improved, and the relation of dealers with them are more uniform and satisfactory. The prices paid to dealers are higher, and the stores, in turn, charge the same to customers, the result of which is

that all parties look more sharply to see that they get the full value of their money. Milk is sold in stores for from five to six cents per quart, — six cents being the most common.

The amount of skimmed milk sent into the market varies very little from last year. There are very few regular dealers, and they find a ready market for all they produce. This branch of the trade has been a great benefit to a class of people who could not afford to purchase a sufficient quantity of whole milk for family use, and who find in pure, fresh, skimmed milk, a healthy article of food. Where this article is openly sold and advertised as such, it is almost invariably a good article, though there is, doubtless, much of it sold which would be better designated as watered milk.

Milk Supply.

The sources of milk supply are the same as formerly, though an increase is noted in the amount raised within city limits. The supply is mainly by railroad, and is brought daily from extreme points of the State, and from New Hampshire. This milk arrives, as a general rule, a pure, rich milk, not a can of which would not go beyond the law standard. The greater part of this supply is under the charge of contractors who thoroughly understand the care and handling of milk.

Another source of supply is from the towns surrounding the city, probably one-third of the amount of milk used in the city coming from that source. Some persons prefer this milk, while others prefer the milk brought over the roads. Many persons also believe, and it is often urged upon them, that "railroad" milk, so-called, is not as good as "farm milk," especially if it is within a few miles of the city. There is no better milk made than that brought into Boston by the railroads. Good milk comes from the town as well as railroads; but certain persons will not let "well enough" alone, hence the variety.

There are few cities better supplied with milk than Boston. The sources of collection and distribution are in the hands of men who have grown with the business; and it would seem difficult to improve the system. Any one who looks upon the arrival of a train laden with thousands of cans of milk, and sees the hundreds of dealers, each loading his team with his daily quantity, and in a few minutes sees cars and teams vanish, would admit the perfection of the system. However perfect the working, however, there are those who dislike the system, and would like to see a change.

During the summer a committee of the Worcester West Milk Producers' Association submitted a report embodying a

plan for the organization of a stock company to bring milk to Boston. The report was accompanied by letters of indorsement from health authorities, and others. The report is carefully drawn, and urges, as arguments, a better article, a better supply, a saving of middlemen's profits, and the closer relation of producer and consumer. The New England Association of Milk Producers, by invitation of the Worcester Association, took the subject under advisement, and reported its hearty concurrence, and it would seem as if the enterprise would be inaugurated at an early day. There have been several attempts to furnish milk to the city, independent of contractors or dealers, but nothing which assumes the proportion of the proposed association. The former trials in this direction have not been fortunate, and have had but a brief existence. Without special acquaintance with them, one cause of failure is apparent. They entered into competition with men who thoroughly understood their business, while they had to live and learn. In such a contest, the struggle is brief.

The milk trade of Boston is estimated at nearly $3,000,000 per annum, and it would appear to be a fair field for a lively and honest competition. The addition of a large number of dealers soliciting business, would make quite a change in many directions, and, doubtless, for the best. It is claimed that the new project is in the right direction, and as such I hail that and every movement which will result or aid in giving our city a pure article of food. Without entering into the merits of the present or proposed plans, much good would probably result from the organization.

Operations of the Year.

Number of wholesale dealers licensed	606
Number of retail dealers registered	746
Number of visits made, and samples of milk inspected	1,325
Number of samples analyzed	25
Number of samples analyzed and not adulterated	7
Largest amount of adulteration (water added in 100 parts,) per cent.	45.00
Least amount of adulteration	10.00
Average amount of adulteration	22.24
Number of prosecutions	14
Number convicted	5
Cases withdrawn	1
Number of cases now pending	8
Number of cows kept in city limits (whose owners sell milk)	822

EXPENSES OF OFFICE.

For analyses	$160 00
For advertising	154 20
For printing, stock, and stationery	52 13
For inspector's bills, instruments, etc.	15 00
	$381 33

INCOME OF OFFICE.

There have been received from license fees during the year, and paid into the city treasury	$676 00
As a result of prosecutions there have been paid in fines and costs	279 00

Analyses made during the Year.

No.	Gravity.	Cream per cent.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. of water added.
1	1.029	7	11.58	3.10	8.48	88.42	20.14
2	1.033	9	13.20	3.58	9.62	86.72	pure
3	1.033	10	13.23	3.60	9.63	86.77	pure
4	1.032	11	11.91	3.53	8.38	88.09	15
5	1.033	7	12.31	3.10	9.21	87.69	10
6	1.032	8	11.72	3.07	8.65	88.28	15
7	1.030	8	11.13	2.82	8.31	88.87	16
8	1.027	7	9.58	2.54	7.04	90.42	33.93
9	1.030	7	11.55	2.20	9.35	88.45	15
10	1.032	7	11.73	3.49	8.24	88.27	19.11
11	1.030	5	12.14	2.87	9.27	87.86	16.28
12	1.029	7	11.80	2.10	9.70	88.20	15
13		8	11.20	2.40	8.80	88.80	20
14	1.027	6½	10.45	1.62	8.83	89.55	30
15	1.026	6½	9.52	2.05	7.47	90.48	33
16	1.027	9	10.33	3.30	7.03	89.69	28.76
17	1.029	8	9.73	2.39	7.34	90.27	32.90
18		6	9.80	1.52	7.28	80.20	30
19	1.029	30	14.37	6.43	7.94	85.63	pure
20		6½	11.20	2.15	9.05	88.80	22
21	1.020	11	8.23	2.01	6.22	91.77	43.25
22		5	10.52	1.58	8.94	89.48	27.50
23	1.031	7½	10.27	2.88	7.39	89.73	29.18
24		4½	10.60	1.82	8.78	89.40	25
25		5	8.62	2.15	6.47	91.38	45

Aside from the above analyses, many experiments have been made gratuitously during the year, the object of which was to test the accuracy of analyses. A pure milk would be selected, and then divided into three parts, two portions of which would be adulterated by five or more per cent., respectively, and then the three portions would be sent to the chemist. The marks of each were taken at the office, and in every instance they came back correctly done. The chemist had no means of knowing one sample from another, and the result added to the confidence already felt in the ability and integrity of the gentleman making the analyses. The chemists employed by office are Professors J. F. Babcock and C. E. Avery.

Amount of Milk Consumed.

In the report of last year an estimate was made of the amount of milk consumed in the city, and as there were no reliable means of ascertaining the amount, though much time and labor was bestowed upon it, it was felt to be imperfect. That report placed the

Daily number of gallons	29,000
Daily cost	$6,900
Number of gallons for year	10,585,000
Cost for year	$2,540,000

As one of the benefits flowing from the law requiring an annual registration, we are enabled to form a very correct knowledge of the actual amount consumed. When a license is issued, among other facts, we get the number of cans which the dealer is then using. It may vary from the figures given, sometimes more, other times less, but the basis is safe. By this means we are able to sum up the total supply. The result will surprise many persons in and out of the business, and for the first time show the pecuniary magnitude of the business.

We have on the books of the office 600 dealers who daily supply the city. From this number we get the

Daily number of gallons	33,084
Daily cost	$7,940.16
Number of gallons for year	12,075,660
Cost for year	$2,898,158

The cost is estimated at six cents per quart, which is a fair average, as much of it is sold at seven and eight cents per quart. Aside from this amount should be added the cream

trade which, though no figures can be given of the amount, is very large, and would doubtless bring the sum total of

Cost for year at $3,000,000

The annual registration has settled the question as to the number of dealers supplying milk to the city. The number is not so large as was generally supposed, and while the number would seem large to many, it will be found on reflection not to be beyond the need of consumers. The milk has to be delivered at a certain time daily, for few persons will wait the convenience of the milkmen. If time were allowed, a dealer might supply double the amount of his daily trade, but customers could ill afford to wait his slower movements. Hence the number is not excessive; indeed many persons get into the business, and find customers from no other reason than the delay of the milkman. The route of a milkman is widely separated, and takes time to go over it. Much time and labor would be saved if arrangements could be made to make the routes more compact; but as each dealer will take customers as he finds them, the present system will prevail.

There have been few changes among the dealers during the year, a few leaving, and some selling their routes. A few new dealers who were never in the business have licensed as wholesale dealers.

The retail dealers, or those who sell in stores, have not fully realized the requirements of law; for, while a large number have registered, there is still a large number who have failed to do so. As the office has tried many ways to reach them, and as ample notice by advertising has been given them, special attention will hereafter be paid to that class of dealers.

The public seem to feel a growing interest in the milk question, and we have had more calls at the office during the year than formerly. The milk brought to the office has been of a better quality than in the past, and as the samples came from every section of the city, it points to a general improvement. The testimony of dealer, producer, and consumer, as well as my own experience, points in the same direction.

The office is supplied with every aid to examine milk; and during the year a centrifugal machine, for raising the cream in a few minutes, has been added. It is a very important instrument, for it enables us in ten minutes to tell the cream-quality of the milk, which, with gravity, and other tests, practically settles the quality of any specimen of milk.

The work of the office will be commenced under more favorable auspices than in the past. We have been moving forward, and gathering experience; we have improved in the law, and in working under it. All parties, producer, consumer, and dealer, are feeling a common interest, and will soon work for a common end, — the good of all. Much progress has been made, and it requires but a vindication of the law now in force to make success sure and permanent.

I have to acknowledge the kindness of T. M. Babson, Esq., of the City Solicitor's office, for his services in defending many of the cases brought in the municipal courts, and bear testimony to his zeal and interest in bringing them to a successful issue. I would also acknowledge the sympathy and support of every official with whom I have been brought in contact.

Respectfully submitted,

MARTIN GRIFFIN,
Inspector.

30 Pemberton Square,
March 31, 1881.

[Document 55 — 1882.]

CITY OF BOSTON.

TWENTY-THIRD ANNUAL REPORT

OF THE

MILK INSPECTOR.

To His Honor the Mayor and the Board of Aldermen of the City of Boston:—

Gentlemen, — The annual report of this office for the year ending March 31, 1882, is herewith respectfully submitted.

The year has been marked by no great change in the method of business, or in the amount or character of the milk trade. While there has been a slight falling off in the number of dealers, the amount of milk consumed has been about the same as the past year. A few routes have changed hands, mostly of small volume, and been merged into larger routes. The trade is so well settled, growing with the needs of the city, that there is little change to note.

The routine of the office-work is the examination of milk brought to office, and the inspection, by examination in teams, stores, and depots. The trade is classified into two classes, — wholesale and retail dealers; the first being those who supply from carriages, and the other, those selling in stores. Each class is licensed to sell milk, the wholesale dealers being required to license annually. A record is kept of every sample of milk inspected, giving date of inspection and character of milk. When an analysis is made, a copy is entered on a record-book of analysis, and the original filed. In all prosecutions it is necessary to have the milk analyzed.

The office is open during the usual hours of business, and

is quite freely used by the public, and by officials and persons outside of city limits. The office is well supplied with means of testing milk, and a visit will soon settle the quality of any specimen brought to it.

Milk Supply.

The supply of milk is principally by railroad, and is daily brought from extreme points of the State, and from portions of New Hampshire. The contractors who run the milk trains have their agents, who collect from the farmers the milk contracted for, and deliver it at depot, carefully place in car, and then places in charge a person who accompanies the train to the city. This is careful work, particularly in summer, when the milk has to be iced and carefully handled. Arriving at city each milkman calls on his contractor's car, receives his milk, and leaves his empty cans for transmission to source of supply. Each dealer examines his milk, and rejects that which is of inferior quality. The contractor also examines, and if of poor quality, returns to the farmer. As each dairy is known by a mark, the milk is easily identified. The agent who collects from the farmers also exercises a supervision over the milk. Many dealers contract directly with the farmers, and have to see to their own supply.

There are several trains of cars supplying the city, and from the nature of the case, coming from long distances, the milk is not delivered for consumption on the day of arrival. With one exception the cars arrive during the forenoon, bringing the morning and evening milk of the day previous, the dealers receiving and properly caring for it till the next day, when it is delivered to customers. It is thus two days' old upon delivery. The milk train of the Boston & Albany Railroad reaches the city about one o'clock in the morning, and the milk could be delivered the same morning, but it is not generally done. There can be no doubt of the quality of the milk coming to the city by these roads. There may be few exceptions; but, as a rule, it is of the very best quality, pure and rich.

The other source of milk supply is from towns in the neighborhood of the city. Perhaps a third of the supply comes from this source. Many persons prefer this milk, thinking it a superior article to that coming by rail. It is in no way superior; the only advantage in its favor being that it is not so old — the morning and evening milk of one day being delivered the next morning. There is also quite a respectable amount of milk produced within city limits by persons who own one or more cows.

The supply of milk has varied considerably during the year, though generally meeting the demand, except for brief periods. In August, of last year, milk was very scarce, and remained so during the month. Since then there has been no difficulty in meeting the demand. The consumption of milk is much greater in summer than in winter, and the lesser demand was more easily supplied.

Price of Milk.

The price of milk during the year 1880–1 had been much higher than for several years previous, and the past year has been marked by a still farther advance. The price of milk is settled in April and November of each year by the contractors and producers, the latter class trying to get as high a price as possible, and the other to keep it down to fair limits. The contractors now charge, at the cars, thirty-seven cents per can of eight quarts and a pint. The dealers from the towns make their own bargains with the farmers; but the cost, by the time the milk arrives in the city, will be very nearly the price paid at the car. The price of milk will, then, be seen to be advancing, and the public cannot understand the necessity of it. The farmers say that the producing of milk, even at present prices, is not remunerative; add to this the labor and capital of those engaged in the transmission of milk to the home of the consumer, and an estimate of value may be reached. The retail price by milkmen is from six to eight cents per quart, seven cents being generally charged. The public has cheerfully responded to the advance of dealers, and dealers have generally avoided competition by ruinous prices and a poor article. The price of milk in stores is from six to seven cents per quart. The prices now charged cannot be said to be excessive, for good milk cannot be produced and sold in our market for less price. Boston has none too large a milk supply for its wants, and it is doubtful if the price of milk for years to come will be less than at present. It is to be hoped that all parties interested in the production and sale of milk will be content with fair profits, and thus encourage the consumption of this valued food among the people.

The advance in price has helped to improve the quality of milk. There is a better feeling among dealers and consumers; less competition in seeking trade by lowering prices, and less temptation to lower the quality of milk. It may be said that the trade is in a very fair condition, and with every prospect of improvement. There is now system and order under a well-defined law. Formerly it lacked

system and method, and the law controlling it lacked efficiency and point. The dealers are getting accustomed to the law as it now stands, and the majority are showing a proper spirit to live up to its requirements.

Last year it was thought that the article of skimmed milk would increase in volume, but it has evidently fallen off during the year. This article is allowed to be sold by law, and is looked upon by many persons as a benefit to a class of people who cannot afford to purchase a sufficient quantity of pure milk for family use. There is quite a demand for the article in certain quarters, particularly in the summer season, and its use is nutritious and healthy.

The Milk Law.

The present milk law was enacted April 22, 1880, and was considered to be very effective. It repealed all other laws in conflict with it; increased the penalties; provided for imprisonment, and established a standard for milk. This standard was all important, for it simplified proceedings in prosecutions, and established by law what kind of milk was fit for use. Prosecutions were early commenced under the law, and nearly every case was contested. In a case tried in July, 1880, and upon conviction in Municipal and Superior Courts, exceptions were taken, and the case carried to the Supreme Court. This appeal had the effect to hamper further prosecutions, and cases were suspended awaiting the appeal. In January of the present year the Supreme Court overruled the objections, thereby fully sustaining the law. It is a gratification that the law has been fully vindicated so early in its history, for it will have great influence on the trade in repressing adulteration, simplifying the trial of cases, and lessen the prospect of escape from the penalties imposed. The following is the rescript of the Court: —

This is a complaint under the Statute of 1880, chapter 209. It alleges that the defendant did "unlawfully sell to one Patrick Scannell, of Boston, for the sum of thirty-five cents, a quantity, that is to say eight quarts, of adulterated milk, that is to say a certain quantity, to wit, six quarts and one pint, of milk, to which a certain quantity, that is to say three pints of water, had been added." The second count charges possession, with intent to sell, milk adulterated in the same manner.

At the trial the defendant asked the Court to rule that the government was bound to allege and prove that the defendant had knowledge that the milk was adulterated. The Court rightly refused this ruling. This has been directly adjudicated in this Commonwealth.

Commonwealth *v.* Farren, 9 Allen, 489.
Commonwealth *v.* Nichols, 10 Allen, 199.
Commonwealth *v.* Winter, 11 Allen, 264.

The defendant asked the Court to rule that the seventh section of chapter 209 of the Statute of 1880 is unconstitutional.

This section provides that "in all prosecutions under this act if the milk shall be shown upon analysis to contain more than eighty-seven per centum of watery fluid, or to contain less than thirteen per centum of milk solids, it shall be deemed to be adulterated."

The intention of the Legislature, and the practical operation of this section, in connection with the third section, is to provide that it shall be unlawful to sell milk containing less than thirteen per centum of milk solids.

This belongs to the class of Police regulations designed to prevent frauds and to protect the health of the people, which it was within the constitutional power of the Legislature to enact.

Bancroft *v.* Cambridge, 126 Mass., 438, and cases cited.

We have difficulty in seeing, as the case is presented to us in this bill of exceptions, that this question was mentioned or properly involved in the case; the complaint being, not under the seventh section, but under the third section, for selling milk to which water had been added.

But as this question seems to have been distinctly raised and ruled upon at the trial, it has been considered.

Exceptions overruled.

As most of the cases prosecuted are contested, much of the time of the inspector is consumed in the courts; more particularly has this been the case the past year, continuing cases to await the decision of the Court. By the decision it is hoped that much of the time and labor heretofore consumed will hereafter be saved.

During the year 1880 a case occurred which was of moment to the office and the public. The law authorized the Inspector to enter all teams, stores, and places where milk was stored, to inspect the same, and to take samples. Without this power the office was almost powerless for good. It became apparent, early in the year, that the right of the Inspector was to be contested. Meeting a milkman one morning, and expressing a wish to examine his milk, the dealer refused, and upon the Inspector taking a can, he forcibly snatched it away. A complaint was entered for resisting an officer, and in due course of time he was convicted in the Superior Court. An appeal was taken to the Supreme Court on constitutional grounds. In January of the present year the Court overruled the objections, and sustained the law.

The following is the rescript of the Court: —

The only question argued in this case is the constitutionality of Section 2, Chapter 122, Statute of 1864, so far as it authorizes inspectors of milk to "to enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof and cause the same to be analyzed or otherwise

satisfactorily tested, the result of which they shall record and preserve as evidence."

It is contended that this provision is unconstitutional, because it authorizes the taking of property without consent or compensation; warrants unreasonable searches and seizures; compels one to furnish evidence against himself; and is not within the police-power of the Commonwealth.

An analysis of a specimen of milk offered for sale is an appropriate means of carrying into effect the various provisions of the statutes regulating the sale of milk in this Commonwealth. In the case at bar the can of milk was taken from a carriage used in the conveyance of milk, and it is unnecessary to consider whether the words of the section, "place where milk is stored or kept for sale," may or may not include a dwelling-house, and whether, if construed to include dwelling-house, they do not purport to give a power which the Legislature could not give, because the clause authorizing an entry into any place where milk is stored or kept for sale is separable from that which authorizes an entry into all carriages used in the conveyance of milk. Neither is the power granted in violation of the following provision of Art. XII., of the Declaration of Rights, viz.: "No subject shall . . . be compelled to accuse, or furnish evidence against himself." If the seizure is such as is authorized by the Constitution, and a law passed in pursuance thereof, the fact that the thing seized may be used in evidence in a criminal charge against the person from whose possession it is taken, does not render the seizure itself a violation of the Declaration of Rights.

Commonwealth *v.* Dana, 2 Met., 329, 337.

If the statute had required that all milk offered for sale should first be inspected, it would hardly be contended that the trifling injury to property occasioned by taking samples for inspection would be such a taking of private property for public use as to require that compensation be made therefor. Such an injury to property is a necessary incident to the enforcement of reasonable regulations effecting trade in food. Private property is held subject to the exercise of such public rights for the common benefit, and in the case of licensed dealers in merchandise, the injury suffered by inspection is accompanied by advantages which must be regarded as sufficient compensation.

Bancroft *v.* Cambridge, 126 Mass., 438, 441.

Instead of requiring all milk offered for sale to be first inspected the Legislature, for obvious reasons, have permitted licensed dealers to sell milk without inspection; have imposed penalties for selling adulterated milk; have defined what shall be deemed adulterated milk; and have provided that when the Inspector of Milk has reason to believe that any milk has been adulterated, he may take specimens thereof, in order that, by analysis, or otherwise, he may determine whether the milk has been adulterated. Such a seizure of milk for the purpose of examination is a reasonable method of inspection, and does not require a warrant. It is a supervision, under the laws, by a public officer, of a trade which concerns the public health, and is within the police-power of the Commonwealth.

Commonwealth *v.* Ducey, 126 Mass., 269.
Jones *v.* Root, 6 Gray, 435.

There is nothing in this case which requires us to determine the rights of the defendant, if the inspector had attempted to take a larger quantity of milk for inspection than was reasonably necessary for the performance of his duties. We have not found it necessary to consider whether the defendant, by voluntarily accepting a license to sell milk,

has not assented to the conditions and regulations which the Legislature has seen fit to impose upon the exercise of the trade licensed.

Pitkins *v.* Springfield, 112 Mass., 509.
Bertholf *v.* O'Reilly, 74 N. Y., 509, 517.

The settlement of this question was anxiously looked for by the dealers, for, if the law was set aside, the fear of detection and punishment for having in possession or selling adulterated milk was removed. Fortunately the law stands a terror to evil-doers, and a protection to the public. These cases but partially indicate many of the difficulties thrown in the way of executing the law, and the time and labor necessary to punish offenders and vindicate the law by prosecution of those who violate its provisions.

The Butter Law.

Since the last report the Legislature has passed the following act: —

[Chap. 292, Acts of 1881.]

An Act to prevent Deception in Sales of Butter and Cheese.

Be it enacted, etc., as follows:—

Section 1. Whoever, by himself or his agents, shall sell, expose for sale, or have in his possession with intent to sell, any article, substance, or compound, made in imitation or semblance of butter or as a substitute for butter, and not made exclusively and wholly of milk or cream, or containing any fats, oils, or grease not produced from milk or cream, shall have the words "adulterated butter;" or if such substitute is the compound known as oleomargarine, then the word "oleomargarine," stamped, labelled, or marked, in printed letters of plain Roman type not less than one inch in length, so that said word cannot be easily defaced, upon the top and side of every tub, firkin, box, or package containing any of said article, substance, or compound. And in case of retail sales of any of said article, substance, or compound not in the original packages, the seller, by himself or his agents, shall attach to each package so sold at retail, and deliver with said package to the purchaser, a label or wrapper bearing in a conspicuous place upon the outside of said package the words "adulterated butter," or the word "oleomargarine," as herein provided, in printed letters of plain Roman type not less than one-half inch in length.

Sect. 2. Whoever, by himself or his agents, shall sell, expose for sale, or have in his possession with intent to sell, any article, substance, or compound, made in imitation or semblance of cheese, or as a substitute for cheese, and not made exclusively and wholly of milk or cream, or containing any fats, oils, or grease not produced from milk or cream, shall have the words "imitation cheese," stamped, labelled, or marked, in printed letters of plain Roman type not less than one inch in length, so that said words cannot be easily defaced, upon the side of every cheese cloth or band around the same, and upon the top and side of every tub, firkin, box, or package containing any of said article, substance, or compound. And in case of retail sales of any of said article, substance, or compound not in the original packages, the seller, by himself or his agents, shall attach to each package so sold at retail, and deliver with said package to the purchaser, a label or wrapper bearing in a

conspicuous place upon the outside of said package the words "imitation cheese," in printed letters of plain Roman type not less than one-half inch in length.

SECT. 3. Whoever sells, exposes for sale, or has in his possession with intent to sell, any article, substance, or compound, made in imitation or semblance of butter, or as a substitute for butter, except as provided in section one; whoever sells, exposes, for sale, or has in his possession with intent to sell, any article, substance, or compound made in imitation or semblance of cheese, or as a substitute for cheese, except as provided in section two, and whoever shall deface, erase, cancel, or remove any mark, stamp, brand, label, or wrapper provided for by this act, or change the contents of any box, tub, article, or package marked, stamped, or labelled as aforesaid, with intent to deceive as to the contents of said box, tub, article, or package, shall for every such offence forfeit and pay a fine of one hundred dollars, and for a second and each subsequent offence a fine of two hundred dollars, to be recovered with costs in any court of this Commonwealth of competent jurisdiction; and any fine paid shall go to the city or town where the offence was committed.

SECT. 4. It shall be the duty of every inspector of milk to institute complaint for violating the provisions of this act whenever he has reasonable cause for suspicion, and on the information of any person who shall lay before him satisfactory evidence on which to sustain the same. It shall be the duty of said inspector to take specimens of suspected butter or cheese, and cause the same to be analyzed or otherwise satisfactorily tested, the result of which he shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admitted in evidence in all prosecutions under this act. The expense of such analysis or test, not exceeding twenty dollars in any one case, may be included in the costs of prosecution.

SECT. 5. For the purposes of this act the terms "butter" and "cheese" shall be understood to mean the products usually known by these names, and which are manufactured exclusively from milk or cream, or both, with salt and rennet, and with or without coloring matter.

SECT. 6. All acts and parts of acts inconsistent herewith are hereby repealed.

SECT. 7. This act shall take effect upon its passage. [*Approved May* 13, 1881.

By this law a new duty is imposed upon the office, Section 4 making it the duty of the Inspector to enforce the law generally, and particularly to institute complaint upon the information of any person who shall lay before him satisfactory evidence on which to sustain the same. Steps for enforcing the law have been taken, analyses made, and prosecutions commenced. The coming year will add experience, and fully test the efficacy of the law.

OPERATIONS OF THE YEAR.

Number of wholesale dealers licensed . . .	543
Number of retail dealers licensed	79
Number of visits made and samples of milk inspected	1,219
Number of samples analyzed	25

Largest amount of adulteration (water added in 100 parts)	40
Least amount of adulteration	15
Number of prosecutions	20
Number convicted	9
Number discharged	1
On file	3
Number of cases pending	7
Number convicted (old cases)	3
Number of cows within city limits (whose owners sell milk)	852

EXPENSES OF OFFICE.

For analyses	$280 00
For advertising	62 42
For printing, stock, and stationery	43 00
To incidentals	11 00
	$396 42

INCOME OF OFFICE.

There have been received for milk licenses during the year	$311 00
As a result of prosecution there has been paid, in fines and costs, during the year	$819 72

MILK ANALYSES MADE DURING THE YEAR.

No.	Gravity.	Cream per cent.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. of water added.
1	1.028	1½	9.20	0.42	8.78	90.80	15
2	"	3½	7.85	0.98	6.87	92.15	35
3	"	5	10.50	1.45	9.05	89.50	20
4	"	8	12.80	2.15	10.65	87.20	
5	"	2	7.42	0.58	6.84	92.58	40
6	"	4.5	11.15	1.46	9.69	88.85	15
7	"	4	9.50	1.32	8.18	90.50	25
8	"	4.5	11.20	1.68	9.52	88.80	15
9	"	7	10.98	2.15	8.83	89.02	15
10	"	5	10.25	1.65	8.60	89.75	20
11	"	7	11.15	2.15	9.00	88.85	15
12	"	7.5	13.70	2.18	11.52	86.30	pure.
13	"	6	10.25	1.92	8.83	89.75	20
14	"	4	10.87	1.80	9.07	89.13	16
15	"	5	10.40	1.58	8.82	89.60	20
16	"	7	10.60	1.95	8.65	89.40	20
17	"	9	10.45	2.65	7.80	89.55	20
18	"	6.5	10.40	1.82	8.58	89.60	20
19	"	7	11.05	2.19	8.86	88.95	15

As the gravity is of little or no moment in determining an analysis of milk, Prof. Babcock, the analyist of the

office, makes no return of gravity. The gravity of each sample, however, was taken at the office, and corresponds with results given. The adulteration, it will be seen, was by skimming and watering. In many of the samples coloring was also used.

Analyses of Butter.

Sample A.

Melting point 35° Centigrade.
Casein, small in amount.
Soluble fatty acids 1.35 per cent.
Insoluble fatty acids 93.52 "

Pure butter fat contains not less than 5 per cent. soluble, or more than 90 per cent. insoluble fatty acids. The sample is one of adulterated butter.

Sample B.

Melting point 34° Centigrade.
Soluble fatty acids 2.10 per cent.
Insoluble fatty acids 93.64 "

The sample is one of adulterated butter.

Sample C.

Melting point 41° Centigrade.
Soluble fatty acids 1.25 per cent.
Insoluble fatty acids 94.64 "

The sample contained a large excess of salt, and but very little caseine. The sample is not genuine butter, but one adulterated with foreign fats.

Sample D.

Melting point 34.5° Centigrade.
Soluble fatty acids 5.60 per cent.
Insoluble fatty acids 88.50 "

In returning this analysis, the chemist says, "The sample, while perhaps containing some adulteration of foreign fats, I do not regard as a sure case, as it comes within the limits of possible pure butter."

Sample E.

Soluble fatty acids 0.65 per cent.
Insoluble fatty acids 95.23 "

Pure butter fat contains not less than 5 per cent. of soluble, and not more than 90 per cent. insoluble fatty acids. The sample is, therefore, not genuine butter, but is an artificial product, consisting almost wholly of foreign fats.

Sample F.

Soluble fatty acids 1.15 per cent.
Insoluble fatty acids 94.10 "

The sample is largely adulterated with foreign fats — not butter.

The last two samples are probably the article known as oleomargarine; the others are adulterated butter.

The amount of milk consumed in the city will not vary essentially from the estimate of last year, when the

Daily number of gallons was . .	33,084
Daily cost	$7,940.16
Number of gallons for year . .	12,075,600
Cost for year	$2,898,158

the cost being estimated at six cents per quart. Add to this the amount of cream sold — a large item in the trade — and there is little doubt that the milk trade would amount in yearly value to $3,000,000.

With a settled law, and many obstructions lessened or removed, and with a better understanding of the law by those interested in its proceedings, it is hoped that the coming year will show commensurate results, and the public interest be still further advanced.

Respectfully submitted,

MARTIN GRIFFIN,
Inspector.

30 Pemberton Square, March 31, 1882.

[Document 75 — 1883.]

CITY OF BOSTON.

TWENTY-FOURTH ANNUAL REPORT

OF THE

MILK INSPECTOR.

To His Honor the Mayor, and the Board of Aldermen of the City of Boston:—

Gentlemen, — The annual report of this office for the year ending March 21, 1883, is herewith respectfully submitted.

The milk trade is now so well settled and defined that there is little to mention that is new, either in amount, character, or method of business, differing from the last year. The method of supply is the same; the number of dealers vary but little; some retiring, by sale of routes, and new dealers entering the business. It is worthy to note how constantly the dealers remain in the trade, for of the changes annually taking place but few old dealers will be found retiring from its pursuit, thus proving that the trade is profitable, and the experience of the past few years has strengthened the hope of continued prosperity for the future. The number of dealers is hardly in excess of demand, and hence there is less clashing of interests, less competition in prices and quality, and a better feeling between dealer and customer.

The Office is used quite generally by the public, who bring samples of milk for inspection, and for information relating to their milk supply. The work of the office in this respect is of great service, for many persons bring milk to the office who have fear as to using it. An examination of the sample at once relieves the mind of the caller, by knowing its quality, and also how to deal with the milkman. By this means, also, we obtain the name and character of the dealer for future use.

and often leading to a prosecution of the offender. It would be gratifying if the office was even more generally used than at present. It has been thought by many persons that a fee was required to examine milk. The office has every facility to examine milk, and though now freely used by people from all sections of the city, and even from surrounding towns, it is hoped that the public, for whose benefit it was established, will further avail themselves of its privileges.

While the office is thus generally used by the public who are very sensitive as to milk adulteration, there seems to be a reluctance in the minds of most persons to do anything to aid in prosecuting the man who has been wronging them. If a milk is pronounced impure by the office, the injured party simply content themselves by discharging the dealer, and thus allow him to impose upon others. A little assistance from the public in this direction would have a salutary effect upon the trade.

Inspection of Milk.

Aside from the inspection at the office, there is also the inspection in stores, teams, and at railroad depots; the teams of dealers being generally most looked after, for there are no other means of knowing how families are supplied than by examination in carriages, and by the samples brought to the office. During certain portions of the year this examination is more general and constant than in others, the summer months requiring all our efforts to prevent fraud and abuse. July and August are very trying months for the milk trade. The demand is largely increased, while, from many causes, the supply falls off; hence the dealer has difficulty in supplying his customers, who in turn are demanding their usual supply. The stores can be visited at all seasons, though receiving in summer a more constant inspection; often daily visits to the same store or locality being required before the end is accomplished. The milk depots at the railroads are always open to inspection, and every facility afforded the Inspector in discharging his duty. A record is kept of every sample of milk inspected, giving date, name of dealer, and the character of the milk.

The milk trade is classified into

1st. Wholesale dealers, or those selling from carriages.

2d. Retail dealers, or those selling milk in stores, etc.

Both classes are to be licensed; the wholesale dealer being required to license annually. The wholesale dealers supply both families and stores; though the general store supply is limited to a certain number of dealers who confine themselves

to that branch alone. The amount of milk sold in the stores is quite large, and often taxes the efforts of dealers to supply the demand.

The entire milk supply of Boston arrives in the city without having had any official inspection whatever. It has had, perhaps, the inspection of the collector; the milkman, who gathers from the farmer, for his own use; and, arriving at depots, the oversight of contractor and milkman, but nothing else. Much of the milk comes from large towns where an Inspector could do much good; but, there being no Inspector, of course there is no inspection; and the dealer, leaving the town, has no fear of interruption or examination until he reaches the city, and hastens in the early morning to distribute his load before meeting the Inspector. If the towns, many of them largely interested in the milk trade, would take means to even partially inspect the milk leaving their limits, it would result in much good to town and city.

Milk Supply.

The question of supplying a city like Boston with an article so universally used as milk is one of no small importance. The supply is never largely in excess of demand; hence even a slight contraction is soon felt. If the use and demand for milk were uniform at all seasons of the year there would be little margin between supply and demand. With a growing population the demand will also increase, and new efforts will be made to meet the coming want.

The past year has been a trying one to producer and dealer, and prices, as well as quantity, have been unsettled. During the past summer the milk supply was very inadequate to the wants of consumers, falling off in quantity daily by thousands of cans. After the flush of June milk the remarkably dry weather set in, and continued all summer, drying up pasturage and vegetation. This caused a shrinkage in milk. The rains of October gave new life to vegetation, and the milk trade resumed its normal condition. Since October the supply has exceeded the demand, and the contractors have sent a heavy surplus to the cheese-factory.

The sources of supply are the same as in past years. The principal supply is by railroad, nearly each line having a milk train attached. The milk arrives at different hours in the morning, but too late for distribution on the same day. The milk coming by rail is owned, and its business conducted, by a class of dealers known as contractors; the contractors then sell the milk to the dealers, who supply the public, each man taking what quantity he desires from the

car and properly caring for it until distribution. This is no small business enterprise, requiring time, system, and labor to daily perform it. There is large capital invested, and a respectable number of persons engaged in its various departments. The system of contractors has grown with the business, and seems well adapted for a rapid and prompt delivery. The milk coming by rail is produced in all parts of the State, much of it coming from New Hampshire. With rare exceptions the quality of the milk is excellent.

Another source of supply is by the towns surrounding the city, perhaps a third of the supply coming from them. The milkmen buy from the farmers, collect the milk over night, and supply their customers the next morning. One advantage of this milk is that it is some hours fresher than that coming from more distant points.

There is quite an amount of milk produced within city limits, many persons adding to their income by the sale of a few quarts or cans of milk, produced from one or more cows, whose milk is partially used by the owners, and the remainder sold to neighbors.

Price of Milk.

The price of milk during the year has advanced, reaching the highest point for many years. The advance was mainly owing to demands of producers, who claimed that, owing to high prices of grain, the prices then paid for milk were not remunerative; and in April an advance was made in prices, which were again advanced in October. The price agreed upon in October was forty-three cents per can, delivered at the car, thus costing the milkman five cents per quart, as first cost, and compelling him to advance the price upon his customers. The price of milk was set at seven and eight cents per quart, eight cents being the ruling price. As an advance had been made in April, the dealers found more or less difficulty in obtaining the price charged, and, where an advance could not be obtained, contented themselves with the old price of seven cents. The public need hardly expect to find the price of milk lower than at present, for it is difficult to see a profit to all persons interested, at less price.

The price of milk is settled, in April and October of each year, by an association of producers, and by the contractors who buy their milk and bring it by rail to the city. This, of course, has no control of those who purchase from farmers, and run milk routes in the city; but, being the principal dealers, the others follow the price set by the contractors. Neither of these parties meddle with the retail price of the milkman. The producers and contractors seldom agree in

their views as to the manner of conducting the business, and the prices to be paid, for both are judging from different stand-points. The contractor has to look to the interests of his customers, as well as his own, and in trying to keep the price at a profit to both often differs with the producers. The contractor knows the amount daily needed by the milkmen, knows the state of the market, and the ability of the dealer to obtain a paying price for his capital and labor.

There is quite a contest going on at present about the price of milk for the next six months. The producers demand that the contractors shall charge thirty-five cents per can, at the car; the contractors refuse to pay more than thirty-two cents. A compromise may be effected by adopting a sum between the two. It is to be hoped that all parties interested in the trade will be content with fair prices, thus encouraging the increased consumption of a food so necessary to the well-being of the public.

The Law.

Each year is proving the value of the law now governing the inspection and sale of milk. It has stood every test of the courts, and trials of cases are simplified, thus saving time and labor in the courts. The clause making a standard for milk has been of great service to the public, and has caused dealers to look sharply after their supply; for it is immaterial how, when, or where, or in whose care or possession it may be, if below the standard it is declared to be unfit for human use, and shall be deemed to be adulterated. Previous to the passage of the law, adulteration had to be proven, and, having no standard, evidence took a wide range, the dealer thinking that if the cow produced such milk, he had a right to sell it, and stoutly maintained that right in the courts.

The prosecutions during the year have been quite successful, and, though a few cases have been contested, a conviction in every instance has been secured. The fine imposed by the courts for a first offence is the minimum one of fifty dollars. Upon conviction, the name and place of business of each offender are published in two papers printed in the city or town in which the offence was committed. It requires care and labor to present a case for successful prosecution.

The laws regulating the inspection of butter and cheese make it the duty of milk inspectors to institute complaint upon the information of any person who lays before them satisfactory evidence to sustain such complaint. Said inspectors can also act upon their own information and belief.

While considerable attention has been paid to the subject, visiting publicly and privately stores and other places where butter was sold, no prosecution has been made during the year. A few samples of what was supposed to be oleomargarine were brought to the office, but on examination proved to be pure butter. While being ready and willing to receive complaints no case was presented for prosecution.

Skimmed Milk.

There are a number of stores selling this article, and during the summer months there is quite a demand for it. It is sold cheaply, and is doubtless a benefit to a large class of consumers, and is an excellent article of food. The supply is limited, mostly coming from farmers, creameries, and a few city dealers.

Operations of the Year.

Number of wholesale dealers licensed	539
Number of retail dealers licensed	33
Number of retail dealers licensed to date	860
Number of visits made and samples of milk inspected	1,153
Number of samples analyzed	14
Largest amount of adulteration	40
Least amount of adulteration	12
Number of prosecutions	13
Number convicted	12
Number discharged	0
On file	0
Cases pending	1
Cases pending at last report	7
Settled by payment of costs	2
Discharged	5
Number of cows within city limits (whose owners sell milk)	977

Expenses of Office.

For analyses	$140 00
For advertising	68 50
For printing, stock, stationery, and incidentals	84 00
	$292 50

Income of Office.

Received for milk licenses during the year	$286 00
As a result of prosecutions during the year there has been paid in fines and costs.	$702 71

MILK ANALYSES MADE DURING THE YEAR.

No.	Gravity.	Cream per cent.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. of water added.
1		7.5	11.50	2.85	8.65	88.50	15
2	1.026	10.	12.05	3.28	8.77	87.95	15
3	1.030	6.	11.26	1.58	9.68	88.74	20
4	1.022	6.	9.50	1.85	7.65	90.50	30
5	1.023	5.	9.10	1.42	7.68	90.90	33
6	1.025	4.	8.62	1.22	7.40	91.38	40
7	1.026	7.	10.90	1.82	9.08	89.10	15
8	1.026	8.	11.25	2.22	9.03	88.75	15
9	1.029	7.	10.40	1.88	8.52	89.60	20
10	1.026	6.5	10.90	1.82	9.08	89.10	15
11	1.029	7.5	11.44	2.05	9.39	88.56	12
12	1.027	5.	9.10	1.32	7.78	90.90	30
13	1.026	8.	10.70	2.58	8.32	89.30	15
14	10.30	6.	10.05	2.10	8.95	88.95	15

The amount of milk consumed in the city during the year shows an increase over the previous year of nearly three thousand gallons daily, making the

Daily number of gallons 35,646

Of the yearly value of the milk trade, including cream, there is little doubt it would reach $3,500,000

In conducting this business the labor of at least fifteen hundred persons, exclusive of producers, is required.

While the office, with its present agencies, can protect the public welfare as well now as in the past, I cannot but feel that a greater work could be accomplished by an addition to its force, and which I hereby recommend.

Respectfully submitted,

MARTIN GRIFFIN,
Inspector.

30 PEMBERTON SQUARE, March 31, 1883.

[Document 57 — 1884.]

CITY OF BOSTON.

TWENTY-FIFTH ANNUAL REPORT

OF THE

MILK INSPECTOR.

To His Honor the Mayor, and the Board of Aldermen of the City of Boston: —

Gentlemen, — The annual report of this office, for the year ending March 31, 1884, is herewith respectfully submitted.

There is little to notice that is new in the operations of the office from year to year, for the routine of duty and business is always the same. The trade itself is so settled and defined that it has no new aspects to present, save in prices and supply. With the exception of speaking of the price, the source of supply, and the amount of milk, the labors of the office are comprised under the head of "operations of the year." Under each head the results are shown by figures, which are carefully recorded in separate books, and can always be referred to. There is also a large amount of work performed, such as investigating complaints, and such like. These are mainly recorded in a journal.

Each department has its book of record. Every sample of milk examined is alphabetically recorded, giving the full history of the sample, and can be referred to at any moment.

The Book of Analyses contains a copy of all analyses made for the office, while the original is filed away. This is a valuable book of reference, as showing the character of milk in past years, with the present.

The Court Records contain the history and result of all prosecutions made by the office from first to final action.

A Daily Journal is also kept, in which is recorded the business occurring at office daily, such as callers, complaints against dealers, etc.

The office is open the usual hours, and is visited by the public in all matters relating to the question of milk; such as bringing samples for investigation, making complaints on various matters, and is used quite freely by dealers. As we never visit dwellings, the only information we have of the character of the family supply is from this source, and a personal investigation. No person need be in doubt about the purity of their milk, when a visit to the office provided by law for the use of the public will give all needed information and assistance. The office is also quite freely visited by inspectors in and out of the State, seeking information. The office is supplied with every means known for the prompt and correct examination of milk.

The milk trade of the city is classified into —

1st. Wholesale dealers, or those selling from carriages.

2d. Retail dealers, or those selling milk in stores, etc.

These two classes are the distributing agents of the milk consumed in the city. The wholesale dealers take their supply from the contractors, and in turn supply the retail dealers, who dispense it to the public. While the process appears to be very simple, yet they are performing a great work. The family supply is furnished by the wholesale dealer, who leaves the milk from house to house. The remainder of the supply is furnished from the stores, and is sold on the premises.

There is a license book kept at the office, which contains the name, place of business, name of employé, the number of cans daily consumed, and number of license. The name, place of business, and number, must be placed on each side of team. As they are required to license annually, a perfect record of their movements is kept, which can be used for any purpose at a moment's notice. This system has been in use since the enactment of the law of 1880, and cannot be too highly commended.

Inspection of Milk.

It may be interesting to know the method and manner of inspecting milk in the city. All the milk arriving in the city comes without any official inspection whatever; therefore the entire supply needs examination, as far as circumstances will allow. Inspection is made by visiting the different sources of supply, depots, stores, and teams.

The teams are most generally looked after, particularly in summer. The team is met, stopped, and one or more samples selected and tested. If the milk is satisfactory the team goes on; if the milk is not satisfactory the inspector takes a sample for further investigation, and, perhaps, for prosecution. This work must be done rapidly, for most of it is done in early morning or forenoon.

The stores are visited in like manner, and the character of the milk noted and preserved.

The milk depots at railroads are also visited, and the milk examined in the same manner. We are often called upon, by the contractors, to visit and examine milk coming over their road.

By these sources the milk supply is examined; and now, what constitutes an inspection?

The system in use in Boston is the same as practised for the past twenty-five years, and is the only method known to us. As far as known it is the system used in all the States, and also in Europe. If milk is to be inspected daily, or as often as practical, it would seem difficult to devise a better way. The form of inspection is by the use of the lactometer, an instrument used only for determining the gravity of milk, and by the judgment and experience of the inspector. He has no other means to aid him. The final form of inspection is by an analysis of a given sample by a chemist, who gives a return of results. With this exception all inspection is performed by the inspector, by the means mentioned. In New York, where they have a large corps of inspectors, the system is the same, the inspector using the instruments, and relying on his judgment for the result, having the advantage by the law making the lactometer a standard, and declaring impure all milk which shall stand below a certain point on the instrument.

It has been claimed, of late, that the system is faulty; indeed, of no value whatever, from the fact that the instrument can be made to stand at almost any gravity by artificial means and the arts of the adulterator of milk, which at once deceives the inspector, who is supposed to have neither intelligence nor experience, and who at once passes the milk as pure. If cream be taken from milk its gravity would indicate a high point of excellence; if watered, or wishing to conceal the skimming process, the milk is brought down to normal gravity, and the inspector is again deceived. He would be a poor inspector who would be deceived by such flimsy tricks. With the present system the character and quality of milk, for all practical purposes, can at once be told with certainty and promptness.

The office never sends a sample for analysis except for the purpose of prosecution. Our judgment says the sample is adulterated, and the return confirms it.

The Milk Supply

Is the same as last year, viz.: By railroad, which brings milk from all sections of the State, and from New Hampshire. These trains, with one exception, arrive about ten o'clock in the forenoon, and the dealers soon relieve the cars of their load, each taking his daily supply. This milk is under the care of contractors, and is the principal source of supply. The other sources of supply are from the territory of twenty or thirty miles from the city, and quite an amount from city territory. The question of supplying a large city like Boston with its daily supply of milk is of no mean importance. With the exception of the summer months the supply will more than equal the demand, and much of the milk received by contractors in fall and winter is turned into the butter and cheese factory.

The system of delivery, as practised in Boston, is the growth of experience, and seems to be admirably adapted for the work. The public are interested in a full and quick delivery of supply, and the system that will best fill that requirement will be sustained. The milk-producers think they can supply a better system, at least in their interest, and are forming societies and associations for the purpose of selling their own milk, and thus do away with the contractors. It is a large experiment, and perhaps, between both systems, the public may reap an advantage.

The Price of Milk.

The price of milk is settled by the producers and contractors in the months of April and October, and is always productive of much argument and feeling. These prices, when settled, set the price for the milkman for what he shall pay the contractors at the depot. It gives him no help, however, as to what he shall charge his customers. The prices agreed to by producers and consumers generally control all contracts of other parties who obtain their own supply from farmers. Milk commanded at depot, since last October, forty cents per can of eight quarts, or five cents per quart. From this price the milkman must make his profit, and obtain from his customers such prices as will allow him to live.

The April price of milk will, no doubt, be an advance over the past, — at least, if the producers can accomplish

that end. The price of milk in our city has always been too low to command a pure article; and a large portion of the community seems to desire a cheap article. The prices at retail during the winter have ruled at seven and eight cents per quart, being still lower in some of the stores. The price of milk is lower in Boston than in most cities and towns of the State. It is a fair statement to say that good prices will command good milk, with, perhaps, exceptions. The spring price is thirty-four cents per can at depot.

Oleomargarine.

In 1882 a law was passed regulating the sale of this article, and made it the duty of milk inspectors to institute complaint, upon the information of any person who lays before them satisfactory evidence to sustain such complaint. Shortly after the passage of the law, with the aid of interested persons, the office instituted complaints in five cases, most of which were settled by payment of costs. The experience was not promising for future operations, and we have confined ourselves to the entering of complaints when presented. The offence in selling oleomargarine consists in misrepresenting the article, and selling without label. No doubt there is a very extensive business carried on in artificial butter. The manner of procuring evidence is peculiar; and we have thought that a public officer should not act as detective or spy. The office was created to protect the public welfare, and we have sought to do what could be done by one man in protecting milk. In this we think we have exercised sound judgment, and best protected the public welfare.

The Purity of Milk.

Boston has been considered one of the best-supplied cities in the Union as regards methods of delivery and the general fairness of its milk. It still retains that character. When it is considered what a large amount of milk is daily consumed, and the ease with which milk is adulterated, the only surprise is that a larger per cent. is not adulterated. If one looked for adulteration they would naturally turn to large centres, and the city would be the first point. There are always loose statements made in regard to milk adulteration, which have an influence on the community, who, without stopping to think of the authority which utters it, are at once alarmed. For the past five years the inspector has devoted his entire time, and performed all the labor which one man could do, in seeking to stop adulteration, and to ascertain the quality of the milk delivered in the city. He found

nothing that should alarm the public, while the percentage of adulteration was low, all things considered; and I have no doubt the milk of the city will compare more than favorably with any city in the Commonwealth. Human nature is much the same whether in town or country; and the milkman who has no one to fear, or to have his milk inspected before delivery, is at least as liable to adulterate as the man in the city, who cannot tell when the inspector shall meet him. Adulteration is simple, and there is little doubt that the milkman of the interior is as apt as the city dealer. There is adulteration enough; but it is unjust to declare that the city is suffering in health and life by the poor quality of its milk. We have often spoken to physicians to note the milk which came under their observation, and during the past five years not a single complaint has been made; and I have yet to meet a sample of milk which would produce sickness, or which was adulterated in any other form than by skimming and watering. No citizen need be in doubt as to the purity of his milk, when, by visiting the office with a sample, he is at once informed of its character.

Operations of the Year.

Number of wholesale dealers licensed	573
Number of retail dealers licensed	25
Number of retail dealers licensed to date	884
Number of visits made and samples of milk inspected	800
Number of samples analyzed	21
Largest amount of adulteration	26 per cent.
Least amount of adulteration	10 "
Number of prosecutions	15
Number convicted	11
Number discharged	2
On file by payment of costs	2
Convicted from last year	1
Total convictions	12
Cases to be entered	2
Number of cows within city limits (whose owners sell milk)	1,132

Expenses of Office.

For analyses	$210 00
For advertising	47 17
For printing, stock, stationery and incidentals	34 77
	$291 94

INCOME OF OFFICE.

Received for milk licenses during the year . .	$299 00
As a result of prosecutions during the year, there has been paid, in fines and costs . . .	687 94
	$986 94

MILK ANALYSIS MADE DURING THE YEAR.

No.	Cream, per cent.	Total solids.	Fatty matter.	Solids not fat.	Water.	Per cent. of water added.
1	6	10.97	2.30	8.67	89.03	15
2	5	10.82	2.12	8.70	89.08	15
3	5	9.75	2.10	7.65	90.25	25
4	6	11.50	2.25	9.25	88.50	10
5	7	10.92	2.10	8.82	89.08	15
6	7.5	10.72	2.15	8.57	89.28	17
7	12	12.60	3.40	9.20	87.40	
8	7.5	10.80	2.05	8.75	89.20	17
9	8.5	12.80	2.42	10.38	87.20	
10	8	11.70	2.62	9.08	88.30	15
11	8	10.66	2.70	7.96	89.34	18
12	12	11.62	3.90	7.72	88.38	15
13	9	11.90	2.95	8.95	88.10	10
14	7	10.30	2.20	8.10	89.70	20
15	10	13.40	3.10	10.30	86.60	
16	16	11.20	4.20	7.00	88.80	25
17	10	9.62	3.10	6.52	90.38	26
18	9	10.12	2.90	8.22	89.88	22
19	11	13.25	3.50	9.75	86.75	
20	6	11.10	2.10	9.00	88.90	15
21	7	10.20	2.35	7.85	89.80	25

It will be observed that the column of specific gravity is omitted in the table on p 7. Prof. James F. Babcock, of Boston, the analyst of the office, prefers not to return gravity, and we print as returned.

The amount of milk consumed in the city during the year shows an increase over the previous year of three thousand four hundred gallons daily, making the daily number of gallons, 39,134.

The yearly value of the milk trade, including cream, will exceed $3,500,000.

Respectfully submitted,

MARTIN GRIFFIN,

Inspector.

MARCH 31, 1884.

[Document 38 — 1885.]

CITY OF BOSTON.

TWENTY-SIXTH ANNUAL REPORT

OF THE

MILK INSPECTOR.

Office of Inspector of Milk, 1151 Washington St.,
Boston, March 31, 1885.

To the Honorable the Mayor and City Council of Boston: —

Gentlemen, — I have the honor to submit the following report as Inspector of Milk for the City of Boston: —

As the Inspector of Milk, I am, by Sect. 20, of Chap. 56, of the Public Statutes, charged with the inspection of butter and cheese, and by Sect. 3, of Chap. 307, of the Acts and Resolves of 1884, with vinegar also.

By the records of the Boston Produce Exchange, there was sold in Boston, during the year 1884, 36,089,617 lbs. of butter, of the value of $9,202,850. Oleomargarine, 3,375,390 lbs., of the value of $438,800. Cheese, 8,293,680 lbs., of the value of $829,368. According to the statements made by the six hundred and sixty-six wholesale dealers in milk, of the city, in taking out their last annual licenses at this office, they collectively sell, upon an average, 36,000 cans of milk a day. These cans contain 8½ quarts, and, at the wholesale price of 40 cents per can, are of the value of $5,256,000 per year. By estimation, upon the best information attainable, there was $500,000 worth of vinegar sold. The yearly value therefore of the foods with the official inspection of which I

have been charged amounts to the grand total of nearly $16,250,000.

Very soon after beginning the work of the office, Dr. Jenks, the chairman of the Police Commissioners, did me the great service of having a complete canvass of the city made, and he reported to me the names of all of those who were found by the officers to be selling milk. These lists of names thus reported by the police were compared with the list of the names of those already recorded at the office as licensed to sell milk. To all those not there found recorded was sent a postal notice calling attention to the requirements of the statute. If not heard from in a month, the collector of samples called to learn if they were still selling milk, and, if so, why they had not responded to the notice sent them. Those who should have taken out a license were thus induced to do so.

Samples of milk have been collected from all the classes of persons engaged in its sale, and, so far as possible, in due proportion to the quantity which they sold, and the liability which was found to exist of its not being of the quality it should be. It has been the endeavor to see to it that the milk brought into the city by the contractors was of the quality it should be; that the peddlers then delivered it as they received it, and that it still remained the same when retailed at the stores. For this purpose, samples from all the different dairies of milk have been taken at the car stations of the different contractors, and when found not to be of proper quality they have been warned against selling the same. In like manner, the same was done with the milk wagons, and at the store. There were nine hundred and ninety-three official notes of warning issued from this office upon samples of milk. This plan of warning upon the first sample found to be below the requirements was deemed desirable for many reasons. If the seller was honestly ignorant of the quality of the milk, it gave him the advantage of the information, and he would look out for it in the future; and thus the real object of the law was attained in the easiest and pleasantest way possible. There seems to be a wide-spread mistaken idea of the reason for having a milk inspector. It is commonly considered to be to prosecute violations of the milk statute; while the real reason is, by him, to obtain pure milk, prosecutions being happily only one of the means sometimes necessary for the attaining of that end. For him to have to resort, however, to that extreme measure is of the nature of a partial failure, even if a conviction is secured, perfect success being to obtain the desired end in the easiest way possible. I am, therefore, pleased to be able to report

that, although I have had to warn about a thousand, I have had to enter only forty-two cases for prosecution in the courts, while four thousand two hundred and seventy-two samples have been analyzed. Less, therefore, than one-half of one per cent. of those warned have had to be prosecuted in the courts, the others having heeded the warning.

There would, in my opinion, be a very great gain in the purity of the milk distributed by the wagons about the city if the following custom were adopted: — Let the morning milking be retained in the country till after the evening milking. After this last has been quickly cooled to about 40° F., — for upon this and the cleanliness about the milk principally depends its sweetness, — let the milk be taken to the railroad station. Once upon the cars, it can be in Boston within three hours, there received by the milk wagons in the early morning, it can be delivered to the consumers directly that same morning, being measured out from the very cans in which it came into the city directly into the receiving vessels provided by the consumers. In this manner it would, upon the average, be twenty-four hours fresher than at present. It would thus escape the great danger naturally due to exposure to the air of most city milk-wagon stables while being run through the cooler or mixer, and put up into small cans for distribution, to say nothing of the unnatural dangers due to coloring, or other additions or subtractions. The fewer times a milk is removed from its containing vessel, the less is its exposure to contamination, for milk is exceedingly prone to absorb foul odors. The city consumer should learn to recognize the natural colors of whole and skim-milk, and learn to know that a milk from which he has himself removed the layer of cream, if not rendered of a somewhat bluish shade thereby, must of necessity have been artificially colored; that the average thickness of the cream which will form upon a fair whole milk after half a day standing still will be about one-tenth the depth of the milk; but that a milk which has been skimmed, and then had some colored water added to it will again throw up just such a thin surface of cream as many city people seem to expect to find upon their milk. A cream, according to the best authorities, is not to be considered worthy of its name if it contains less than 25 % of butter fat. It may contain 90 %. Yet so-called samples of cream have been brought to this office for analysis which contained but one-fifth of the former amount, and were only samples of fairly rich Jersey milk.

The popular older methods of examining a milk for its quality by means of the lactometer and cremometer have

proved to be but delusive guides, and this for the following reasons: the lactometer is a glass float bearing upon it a mark of the point to which it will sink in an average whole milk at the temperature of 60° F. Any increase of temperature will make it sink lower, or any decrease not so far; yet, as commonly used, temperature is entirely disregarded. Moreover, fair whole mixed milk has not one fixed gravity, but ranges from 1.029 to 1.033 at 60° F. Now as the cream is the lighter portion of a milk, when this is removed, the skim-milk which remains has a higher gravity than the original whole milk. The lactometer will not therefore sink in it so deeply as before; but, upon the addition of the proper amount of water, it can again be made of the same gravity as before, so that the lactometer will sink in it to the very same point that it did in the original whole milk. Thus, so far as the lactometer itself is concerned, it will not distinguish between a whole and a watered skim-milk. Moreover, the presence of more than the average amount of cream will make it sink deeper, just as would the addition of water. But it has been claimed that any such error can be guarded against by setting the sample aside in a cremometer to see how thick a layer of cream will rise upon it. This, again, is a delusion, for a milk to which some water has been added will, in a few hours, throw up a thicker layer of cream than a portion of the same milk to which water has not been added. This is a secret of the milk trade too well known among themselves. Then, too, the thickness of the layer of cream depends upon many other attendant circumstances than the richness of the particular sample, such as the time since the milking, the breed of cow, the temperature, previous amount of agitation to which it has been subjected, etc., etc. Thus, under these varying circumstances, two portions of the same milk may the one yield a cream four times as thick as the other; and again, of two creams of the same thickness the one may contain four times as much butter fat as the other. How much the first, middle, and last pints of the same milking may differ from each other is seen on comparing together milk analyses Nos. 11, 12, and 13, where the last pint was found to be nearly twenty times as rich in fat as the first one. It is, after all, the percentage of the butter fat rather than of the cream which constitutes the richness of a milk.

I, therefore, have analyzed all samples of milk by the following modification of the Wanklyn method, either in full, or in part in some cases where the analysis before being fully completed would show that the sample would in all probability conform to the requirements of the statutes. The

sample, on being brought to the office, is set into a sink partly filled with running water kept as nearly at the temperature of 60° F. as convenient. While it is gaining this temperature, its reaction upon litmus paper is taken. All milk which I have myself seen drawn from the cow has had at that time a slight acid reaction upon litmus, although the paper, while drying, may regain its original color, presumably from the escape of the carbonic acid gas natural to the freshly-drawn milk. The so-called amphioteric reaction of milk is commonly explained by the presence of the acid and neutral phosphates. The chemical reaction, therefore, offers a ready means of inferring the probable age of a milk. Fresh milk will have a slight acid reaction. It becomes neutral, and then gradually, more and more acid as lactic fermentation progresses. A marked alkaline reaction does not occur in a healthy natural milk. The artificial causes are commonly the addition of some alkaline preservative. When the milk has gained the proper temperature, its specific gravity is taken by a spindle float about nine inches in length and with a scale of from 1.000 to 1.040, the apparent gravity being corrected for the real by the subtraction of 0.001 for every decrease of 10° F. below 60° F., or of 5° C. below 15° C., and *vice versa*.

A tube is filled to the height of 150 or 200 mm. with the milk and set aside to the end of the day's work for the cream to rise. Its thickness is then read off upon a rule divided into millimetres, on which each 1 mm., according to the depth of milk taken, represents $\frac{3}{4}$ or $\frac{1}{2}$ of 1% of cream. An estimation of the probable percentage of fat by weight present in the sample is also here made by the ready optical test of Prof. Feser's lactoscope. This requires but about three minutes' time, and, with a milk in which the fat globules have not yet been altered, will denote the true per cent. of fat to within $\frac{1}{4}$ of 1%. This error is incident to the fact of the tube having been graduated upon a milk of the average number and size of globule. Just how plainly the marks within the tube should be visible through the milk is best determined by the experience gained by first determining the per cent. of fat by actual analysis, and then by seeing how plainly they are visible when another portion of the same milk is diluted just up to that per cent. in the lactoscope. A score or so of such comparative experiments will give one the necessary experience. It does not read quite so close to the true in a skimmed milk as in one which has not been, for the probable reason that the process of separation of the cream has altered the relative size of the fat globules. In such a milk the error may be about $\frac{1}{2}$ of 1%. Healthy

mixed whole milk I have found to have a gravity of 1.029 to 1.033 at 60° F., and to have not less than 3% fat by the Feser lactoscope. Some Jersey milks have had over 6% of fat. I have found that a milk with a gravity over 1.030 and with over 3 % of fat by Feser will, upon full evaporation, almost always yield over 13 % of solids. It is possible, however, only by a further chemical analysis, to determine if these are milk solids, as a very rich milk may be watered, and the solids made up by the addition of sugar, salt, or something else.

I have perfectly flat bottom platinum capsules with a diameter of $2\frac{1}{4}$ inches across the bottom, $2\frac{1}{2}$ at the top, with $\frac{1}{2}$-inch wide rims, upon which a number is engraved. Their average weight is 18 to 19 grammes. One of these being taken from the dessicator, and balanced upon a Becker scales, which is sensitive to $\frac{1}{4}$ of 0.001 grm., and thus its weight taken from a table on the scales being verified, the 5-grm. weight is replaced by a 10 grm., and then 5 grms. of the well-mixed milk weighed off by letting it run out from a filled 5 cc. pipette. By letting the last portion fall out in drops, it is easy to stop with the last drop, which gave the down weight. If the whole of this last drop was left to remain, there could be but part of less than 0.050 of milk taken in excess, as my pipette measures less than 3 mm. across its point. This excess can be removed by dipping into it the point of a piece of filter paper. As, however, this area of milk surface may lose about 0.035 in weight in five minutes, it is more accurate not to try to remove this part of a drop taken in excess, but to let the sample have the advantage of it. The filled capsule is now placed upon a large flat-top copper water-bath, which has no opening in its top. The whole of the about 4-square-inches bottom of the capsule being in contact with the copper, the evaporation proceeds very quickly, and its completion is much hastened in the following manner. When the film has formed over the milk surface, by aid of about half an inch of fine platinum wire soldered by one end into a glass rod, and bent at the other into a small sharp hook, the film is detached from the edge of the capsule, and then by tilting the capsule the still fluid portion is made to flow out over the film, and thus to present a fresh surface for more rapid evaporation. The platinum hook is so small that no visible amount of material is left upon it. Aided in this manner, in favorable conditions of atmosphere, it becomes apparently fully dry in about half an hour. It is then transferred into a drying-oven, kept at a constant temperature of between 100 and 105° C. Here, in about an hour more, it attains an about constant weight, that

is, one which, by half an hour more drying, would, after cooling in a dessicator, be found to have lost less than 0.005 in weight; that is less than $\frac{1}{10}$ of 1%, which is an accuracy all sufficient for every practical purpose. The weight of the residue now obtained, when multiplied by 20, gives the per cent. of total solids of the milk.

The capsule with its contents, which is but a thin layer upon the bottom, is then replaced upon the water-bath and filled with a freshly distilled petroleum benzine, which has been found to conform to all the requirements of the U.S. Pharmacopœia of 1880. This quickly begins to boil, and is allowed to do so for about a minute. The fluid is then decanted off against a rod, which can be quickly done, as hardly one time in a thousand will there be any detached portion of residue liable to go off with it; and if there were, it would be saved upon the bottom of the receiving beaker. This boiling up with benzine is repeated three times, and the capsule is then washed off both inside and out with the benzine from a wash-bottle, whereby all fatty matter is completely removed. The capsule is then dried off in the oven, cooled in dessicator, and then quickly weighed. This residue is the solids not fat, and its difference the fat. At a temperature of not over 105° C., the milk solids, such as milk sugar, etc., are not decomposed. Allowed to cool in the free air outside of a dessicator, they would absorb about 0.010 moisture in about as many minutes. Petroleum benzine is used rather than ether, because that the alcohol and water always present in the stronger ether, even of pharmacopœial quality, will always dissolve out other portions of the milk solids along with the fat, which the benzine does not do. Then, too, five gallons of the benzine cost no more than one pint of the ether. The solids not fat, when ignited at a low red heat over a Bunsen lamp, give the per cent. of ash, or of inorganic salts present in the milk. Thus, by this method the per cent. of water, total solids, fat, solids not fat, and mineral salts or ash, will all have been determined upon the one sample of milk taken into the capsule and not removed therefrom until the end. Hereby the loss of substance necessarily incident to any transfer to another vessel is avoided. The per cent. of water present in the sample of milk over and above the 87 per cent. allowed of in the statute is determined by dividing by 0.13 the excess of the per cent. of water found over the 87 per cent. allowed. Thus, therefore, each 0.13 per cent. of water found in the sample in excess of the 87 per cent allowed of in the statute represents 1 per cent. of excessive or of added water.

The percentage of milk sugar in a milk is most quickly

and accurately determined by a polariscope, such as the saccharometer of Soleil-Ventzke, which is the instrument used by the U.S. Revenue, in the following manner: A tared beaker has marked upon it the level for 65.36 grms. of an average milk. This beaker is filled up to about the mark with the milk being analyzed, and placed upon one pan of the scales, with the tare weight of the beaker and 65.36 grms. more upon the other pan; more milk is then run into it by drops from a pipette until the last drop gives an excess. This, as in the weighing into the platinum capsule, is not removed. The milk is poured out into and the beaker washed into a 100 cc. flask. To it is added about 5 cc. of the usual sugar-clarifying solution of basic acetate of lead, or, better still, and especially with a human milk, 1 cc. of the solution of nitrate of mercury of the strength of the U.S. Pharmacopœia of 1870. After the contents of the flask have been thoroughly shaken up, and allowed to stand for about five minutes, the flask is filled just up to the 100 cc. mark, shaken up again, and, without any heating, poured out upon an about 6-inch, dry, fine-ribbed filter of as good a quality of paper as that made by Schleicher & Schüll of Düren. This will filter it quickly and clear. As, however, the precipitated albuminoids have an average volume of about 2.5 cc. the 100 cc. solution will be by that amount too concentrated, and hence the direct reading of a 200 mm. observation tube in the polariscope will be 0.25 per cent. too high. As twice the normal quantity for the instrument is taken, the apparent reading after correction by the deduction of the 0.25 per cent. is to be divided by 2 to get the true percentage of milk sugar contained in the sample. By taking the double quantity, any error in the reading of the instrument is reduced by one-half. Any addition of cane-sugar to the milk is detected at this point, and if any artificial coloring matter has been added it is made very manifest in the coagulum upon the filter. The percentage weight of the albuminoids, inclusive of the casein, is the difference between the solids not fat and the sum of the milk sugar and ash.

This process of analysis which I have described in so full detail is really very simple in fact, and capable of such rapid execution that I have finished twenty-five full analyses by it in a single day. This, with capsules of less relative size, or not flat bottoms, or differently manipulated in the process of drying, fat extraction, and sugar determinations, I do not think that it would be possible for one to do. By the aid of the Feser lactoscope throwing out such samples as would almost, of a certainty, be found upon proper analysis to contain not less than 13 per cent. of milk solids, one person

can in one day examine quite a large number of samples. This is the course that has been pursued in making examinations at the contractors' depots. Thus pint samples of all the dairies not surely up to standard could be taken back to the laboratory for an evaporation and further analysis, either as to a few or as to all the constituents. In the extended analysis, all of the following twelve determinations were made: —

1. Color, if added.
2. Reaction on litmus.
3. Specific gravity at 60° F.
4. Cream, per cent. by volume.
5. Milk sugar, per cent. by weight.
6. Albuminoids, (casein, etc.), by weight.
7. Ash (mineral salts), per cent., by weight.
8. Solids, not fat, per cent. by weight.
9. Fat (butter), per cent. by weight.
10. Total solids, per cent. by weight.
11. Water, per cent. by weight.
12. Water in excess of the statute, by weight.

Prof. Heeren's pioskop, or milk-tester, is the most ready means for use in private families of any I now know of to be had for the price of fifty cents, which will usually detect a skimmed or watered milk when offered for a whole milk.

Something further is necessary for the proper inspection of the milk supply of a city than can be learned by any chemical or microscopical examination of it. To insure that the quality of the milk is what it should be, the cows themselves must also be examined. The milk from no tuberculous or otherwise diseased cow should be allowed to be sold. It should be seen to that the stable is in a proper sanitary condition as regards ventilation, drainage, cleanliness of stalls and udder at the time of milking. It should also be seen to that the water and food are of a healthy character, and that the cans are properly attended to. If these matters at the farm are not properly cared for, although chemistry and the microscope may not be able to show anything wrong in the milk when received in the city, it may yet be the occasion of sickness and death. Many epidemics of typhoid fever, scarlet fever, and other diseases have now become well known as having been occasioned by some faulty milk supply.

Certain important amendments to the present milk statute have been suggested to the present legislative committee on public health in regard to the manner of taking samples of milk, forfeiture of license upon conviction, the manner of

marking skim-milk cans, standard for solids not fat of skim-milk, and the jurisdiction of the district courts over violations of the statute, which, if they should be enacted by the Legislature, would greatly assist in decreasing the amount of adulteration in milk.

About 13.75 per cent. of milk solids seems to be the average for whole milk raised in the eastern part of this State from so-called common native cows, with an average of 3.80 per cent. of fat, 9.95 solids not fat, 0.70 ash, 4.50 albuminoids, and 4.75 milk sugar. The average of milk solids in all the milks of known purity from all kinds of cows which I have examined has been 14.5 per cent.

With an appropriation entirely inadequate to the necessary amount of work for the proper protection of the milk supply alone, I have had but little to devote to the subjects of butter and vinegar, which are of so much less importance, as they do not materially affect the public health.

According to the most reliable information obtainable, not more than one-fourth part of the imitation butter sold in this city is sold under its own proper name. This, according to the records from the Produce Exchange, given elsewhere in this report, would make it of the value of about two millions of dollars last year.

Forty-two samples of butter, collected principally from the stalls of the largest two market-houses in the city, were analyzed by the Hehner method for the amount of insoluble fatty acids contained, and by the Koettstorfer's method for the relative amount of caustic potash consumed in the saponification. If by the first method more than 88 % of insoluble fatty acid is obtained, or if in the second method less than 225 mgrms. of potash is consumed, the sample is commonly to be deemed to have been adulterated. Some modification of the Reichert method, such as Meissl's for the soluble fatty acids, I think is the most reliable of those now in common use for butter analysis.

Of the three hundred samples of vinegar analyzed, one hundred and fifty have been found to be of good quality, as required by the statutes. In Doc. 64 of 1883 and Doc. 62 of 1884, I have stated what straight cider-vinegar should be found to be, and the easiest methods of determining the acid strength, etc.

There are certain characteristics of a pure cider-vinegar residue of which I have not, in my two previous reports, made any mention. They are as follows: it is always soft, viscid, mucilaginous, of apple flavor, somewhat acid and astringent in taste. A drop of it in a loop of a platinum wire when ignited in a Bunsen lamp flame gives a pure potash

flame without any yellow soda-rays visible. The ignited residue is quite a good-sized and fusible bead, of a strong alkaline reaction upon test paper, and effervesces markly when immersed in an acid. None but a perfectly pure cider-vinegar will yield a residue entirely of this character. Colored vinegars differ in many particulars from it. The addition of any practical amount of a commercial acetic acid to "tone" up the strength will give another color to the flame. The presence of any *free* mineral acid would prevent the ignited residue on the platinum wire having any alkaline reaction. If any corn glucose is present, the residue, when igniting in the platinum loop, will emit the characteristic odor of burning corn; and if the glucose was manufactured with the commercial sulphuric acid derived from copper pyrites, it will, as the last spark glows through the carbonized mass, emit the familiar garlic odor of arsenic.

I have lately stated to the legislative committee upon public health that if, in their judgment, it should be thought expedient in the case of cider vinegar to place the standard for acidity equivalent to monohydrate acetic acid at $4\frac{1}{2}\%$, then the amount of cider-vinegar solids that ought to be required should not be less than 2%.

I have also recommended that the vinegar statute be so changed as to require all vinegars to be marked with the name of the kind of vinegar which it purports to be, and with the word "colored," if any coloring matter has been added to it. These changes would greatly facilitate the enforcement of the statute and the prevention of the sale of imitation cider-vinegars.

During the past, not yet a full year, since the enactment of the present statute, fixing a standard for the acidity of vinegar, there has been a very great improvement in the quality of that offered in this market. There has been such an increase in the price of the pure article that it has become worth while for the farmers to take some care in its production, and I think that any lowering of the standard will only result in their disadvantage, although many of them seem at present to think otherwise. The revolving Luxembourg generators seem to be able to make over five per cent. vinegar out of fully fermented unrefined cider within at most ten days, and they will probably revolutionize the trade. The per cent. of acid strength can be translated into the older commercial term of grains of bicarbonate of soda by simply multiplying it by 6.72, and grains of course can be changed to per cent. by dividing by the same.

During the ten months since coming into this office, the following work has been done:—

Wholesale milk dealers licensed	669
Retail " " registered	1,488
" " " " to date	2,373
Total	3,039
Samples of milk analyzed by the more extended method	1,202
Samples of milk analyzed by the shorter method,	3,028
Total number analyzed	4,230
Official warnings issued	993
Cases of prosecutions entered in municipal courts,	42
" " final convictions	23
" placed on file	5
" *nolle prosequi*	4
" pending	1
" discharged	9
Samples of butter analyzed	42
" " vinegar "	300
Total number of analyses made by the office	4,572

INCOME FROM THE OFFICE.

Received for milk licenses and registrations		$1,079 00
" as the results of prosecutions in fines and costs		826 00
Total		$1,915 00
The appropriation of		$400 00
has been expended as follows:—		
For advertising as required by the statutes	$82 00	
For printing, stationery, etc.	179 07	
" assistance on milk analyses	112 77	
" laboratory supplies and reports	25 83	
Total,		399 97
Leaving a balance unexpended of		$ 03

Very soon after coming into the office, I learned that the appropriation which had already been made would be totally inadequate for the amount of work that would be required to be performed during the year, and so informed his Honor the Mayor and several members of the City Council. On Sept. 13, I sent his Honor a formal communication to that

effect, which he laid before the Board of Aldermen at its meeting, on Sept. 16 with his recommendation for an increased appropriation. On Oct. 30, 1884, not having received any, I, in Doc. 135, 1884, made a formal statement in print to the City Council of how my appropriation had thus far been expended, and a respectful request for an additional amount sufficient for the efficient carrying on of the work for the remainder of the year. On Jan. 15, 1885, I again, in Doc. 11, 1885, for the third time presented my request to the city for aid in carrying on the work of my office in an efficient manner, as required by my oath of office. Not having received from the city the oft-requested aid, I have paid out of my own funds for assistance rendered me in the necessary work of my office the sum of $402, and for chemical supplies now consumed $50. I have visited and thoroughly inspected, for the benefit of my office, the manner in which the milk business was carried on in the cities of New York, Brooklyn, Philadelphia, Baltimore, Washington, Cincinnati, Chicago and St. Louis, at a personal expense of some $200, and having been furnished by the city with none of the apparatus necessary for the proper performance of the duties of my office, I have furnished and maintained a laboratory well equipped with all the modern scientific appliances for such a work, at a personal expense to myself of over $1,000 for the apparatus. Here all have been welcomed to have any samples of foods, with the inspection of which I was officially charged, analyzed for them free of all expense, whereas heretofore they have had to leave $10 at this office to pay for such a milk-analysis as I gave them. Over a thousand samples have been thus analyzed for citizens.

The detail results of the first 1,200 milk samples, of some creams, and of the butters, are given in the following tables, the appended notes giving further detail about some of them : —

MILK ANALYSES 1884–5.

* Signifies samples of milk of known purity.
† Signifies samples of cream.

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
1	1.033	. . .	. . .	. . .	0.65	9.2	0.70	9.9
2	. . .	. . .	. . .	. . .	0.60	8.6	3.1	11.7
3	. . .	. . .	. . .	. . .	0.63	9.01	2.9	11.91
*4	1.032	6.0	4.25	3.99	1.0	9.24	3.16	12.4
*5	1.031	4.0	3.65	3.57	0.57	8.79	3.08	11.87
*6	1.033	12.0	3.7	5.88	0.60	10.18	4.82	15.0
*7	1.031	12.0	3.3	4.9	0.68	8.88	4.62	13.5
*8	1.0315	8.0	4.15	4.07	0.61	8.83	3.16	11.99
*9	1.0325	8.0	4.4	4.74	0.67	9.81	4.69	14.5
*10	1.0305	5.0	4.5	3.74	0.67	8.91	3.44	12.35
*11	1.0365	2.0	4.5	4.96	0.64	10.10	0.36	10.46
*12	1.0345	5.0	3.5	5.7	0.65	9.85	2.66	12.51
*13	1.0295	16.0	4.15	4.61	0.64	9.4	6.2	15.6
14	1.03	11.0	3.75	4.45	0.64	8.84	3.4	12.24
15	1.028	14.0	3.95	3.35	0.64	7.94	2.8	10.74
16	1.018	60.0	2.95	4.49	0.43	7.87	10.62	18.49
17	1.02	66.0	4.15	2.89	0.54	7.58	13.12	20.70
18	1.0305	8.3	4.35	2.91	0.58	8.84	2.81	11.68
19	1.0315	12.5	4.25	3.99	0.65	8.89	3.34	12.23
20	1.0325	13.3	4.7	3.922	0.61	9.232	3.138	12.37
21	1.026	10.0	3.25	4.05	0.45	7.75	3.12	10.87
22	1.0275	8.3	4.15	3.194	0.56	7.904	3.356	11.26
23	1.03	6.0	4.35	3.73	0.62	8.08	2.12	10.20
24	1.028	10.0	4.4	3.16	0.58	8.14	2.9	11.04
25	1.028	11.0	4.75	2.97	0.68	8.80	3.94	12.74
26	1.0245	7.0	3.65	3.25	0.53	7.43	2.7	10.13
27	. . .	3.9	3.9	4.9	0.68	9.48	1.44	10.92
28	1.032	. . .	4.	5.04	0.77	9.81	2.56	12.37
29	1.032	. . .	3.6	4.3	0.64	8.54	1.22	9.76
30	1.03	5.0	4.5	3.9	0.58	8.98	2.14	11.12
31	1.0295	5.0	4.4	3.84	0.69	8.93	1.9	10.83
32	1.022	25.0	3.9	2.9	0.67	7.87	6.98	14.45
33	1.0295	8.0	4.9	3.26	0.6	8.76	2.44	11.2
34	1.0245	9.0	3.6	3.32	0.64	7.56	2.5	10.06

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumi-noids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
35	1.03	8.0	4.5	3.92	0.63	9.05	2.86	11.91
36	1.03	6.0	4.75	3.39	0.6	8.74	2.2	10.94
37	1.031	6.0	4.65	3.55	0.67	8.87	2.0	10.87
38	1.03	7.0	4.35	4.99	0.64	9.98	1.1	11.08
39	1.031	8.0	4.9	3.9	0.68	9.48	3.7	13.18
40	1.027	4.0	3.6	3.62	0.59	9.81	1.28	9.09
41	1.025	6.0	3.55	3.06	0.57	7.18	1.79	8.97
42	1.029	5.0	4.35	3.35	0.6	8.3	2.08	10.38
43	1.024	5.0	3.65	2.83	0.5	6.98	1.38	8.36
44	1.028	7.0	4.2	3.34	0.61	8.15	1.96	10.11
45	1.027	8.0	4.1	3.13	0.65	7.88	2.62	10.5
46	1.029	4.0	8.51	3.49	0.76	8.4	0.40	9.0
47	1.028	7.75	4:2	3.5	0.54	8.24	2.0	10.24
48	1.026	9.0	4.35	3.01	0.57	7.93	3.04	10.97
49	1.028	8.0	4.4	3.14	0.54	8.08	2.26	10.34
50	1.028	7.0	4.0	3.62	0.52	8.14	2.44	10.58
51	1.026	7.0	4.4	2.44	0.60	7.44	2.36	9.8
52	1.028	8.5	4.25	3.35	0.51	8.11	3.0	11.11
53	1.028	8.0	4.25	3.13	0.6	7.98	2.46	10.44
54	1.0285	6.0	4.5	2.76	0.5	7.76	2.54	10.30
55	1.027	9.0	4.4	2.79	0.51	7.71	2.94	10.65
56	1.031	7.0	4.8	3.6	0.60	9.0	2.84	11.84
57	1.0325	10.0	4.9	3.96	0.62	9.48	3.12	12.6
58	1.031	7.0	4.8	4.14	0.63	9.57	4.0	13.57
59	1.03	4.0	4.45	3.89	0.54	8.84	1.44	10.28
60	1.03	7.0	4.7	4.76	0.57	10.03	1.0	11.03
61	1.0295	4.0	4.4	3.7	0.54	8.64	1.7	10.34
62	1.0295	5.5	4.25	3.29	0.68	8.22	2.36	10.58
63	1.027	6.0	4.35	3.45	0.60	8.4	2.24	10.64
64	1.028	8.0	4.4	3.32	0.652	8.37	2.7	11.07
65	1.026	4.0	3.65	3.45	0.50	7.0	1.6	8.6
66	1.032	2.0	4.45	4.01	0.504	9.06	0.5	9.564
67	1.023	16.0	3.9	2.94	0.5	7.34	4.62	11.96
68	1.027	6.0	4.0	3.54	0.604	8.14	2.14	10.28
69	1.027	6.5	4.3	3.06	0.58	7.94	2.58	10.52
70	1.032	8.0	4.8	4.06	0.62	9.48	3.7	13.18
71	1.029	8.0	4.2	2.92	0.32	7.44	5.34	12.78

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumnoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
72	1.024	9.0	3.9	2.9	0.63	7.43	3.7	11.13
73	1.03	4.5	4.6	3.76	0.54	8.9	2.24	11.14
74	1.028	8.0	4.2	3.9	0.572	8.672	2.6	11.272
75	1.03	7.0	4.7	4.3	0.6	9.60	2.5	12.1
76	1.032	4.0	4.8	3.7	0.564	9.064	1.3	10.364
77	1.028	3.0	4.35	3.27	0.54	8.16	2.1	10.26
78	1.027	5.0	4.25	3.25	0.52	8.02	2.16	10.18
79	1.028	7.0	4.6	4.2	0.80	9.6	4.5	11.4
80	1.0275	7.0	4.25	3.51	0.8	8.56	2.8	11.36
81	1.026	5.0	4.0	3.16	0.48	7.64	1.58	9.22
82	1.025	7.0	4.0	3.26	0.54	7.8	2.64	10.44
83	1.029	6.0	4.0	3.56	0.58	8.14	1.94	10.08
84	1.03	6.0	4.4	3.16	0.512	8.072	2.14	10.212
85	1.032	7.0	4.8	3.94	0.6	9.34	2.46	11.8
86	1.029	9.0	4.3	3.7	0.504	8.504	2.86	11.364
87	. . .	7.0	4.3	3.6	0.66	8.56	2.28	10.84
88	1.033	6.0	5.0	4.1	0.72	9.82	3.10	12.92
89	1.027	10.0	4.1	3.42	0.46	7.98	3.1	11.08
90	1.027	5.0	3.8	3.58	0.56	7.94	1.42	9.36
91	1.034	3.0	4.9	4.26	0.58	9.74	0.60	10.34
92	1.027	4.0	3.6	2.32	0.48	7.4	1.1	8.5
93	1.032	6.0	5.0	3.94	0.64	9.58	2.26	11.84
94	1.023	9.0	3.4	2.8	0.372	6.972	0.8	7.772
95	1.028	8.0	4.1	3.6	0.54	8.24	2.8	11.04
96	1.033	2.0	4.65	3.59	0.53	8.77	0.67	9.44
97	1.027	5.0	3.85	3.35	0.54	7.74	2.4	10.14
98	1.027	3.0	3.9	3.04	0.5	7.44	0.76	8.2
99	1.026	8.0	3.75	3.65	0.4	7.8	2.34	10.14
100	1.025	6.0	3.5	3.36	0.312	7.172	2.04	9.212
101	1.031	7.0	5.0	3.70	0.60	9.3	3.2	12.5
102	1.028	4.0	4.1	3.5	0.464	8.064	1.6	9.664
103	1.0315	6.0	4.7	3.7	0.56	8.96	1.8	10.76
104	1.025	6.5	3.9	3.32	0.5	7.72	2.78	10.5
105	1.0265	8.0	3.95	3.67	0.52	8.14	2.4	10.54
106	1.0305	10.0	4.7	4.52	0.61	9.83	2.7	12.53
107	1.0287	6.0	4.3	4.04	0.54	8.88	2.16	11.04
108	1.0235	5.0	3.75	2.85	0.48	7.08	1.02	8.1

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
109	1.0305	6.0	4.15	4.07	0.58	8.8	1.6	10.4
110	1.026	8.0	3.9	3.74	0.472	8.112	1.86	9.972
111	1.0225	2.5	3.35	2.53	0.44	6.32	1.08	7.4
112	1.028	6.5	4.1	3.8	0.53	8.43	2.5	10.93
113	1.031	5.3	4.55	3.95	0.54	9.04	2.1	11.14
114	1.026	6.5	3.85	3.45	0.6	7.9	2.8	10.7
115	1.0305	5.0	4.15	4.01	0.64	8.8	2.4	11.2
116	1.0285	6.0	4.35	3.65	5.72	0.572	2.2	10.772
117	1.0252	4.0	3.6	3.0	0.5	7.1	1.0	8.1
118	1.03	8.0	4.85	3.95	0.564	9.464	3.04	12.504
119	1.0323	10.0	5.0	4.48	0.7	10.18	2.78	12.96
120	1.032	8.7	5.0	4.6	0.62	10.22	3.44	13.66
121	1.0295	7.3	4.25	3.85	0.6	9.7	1.5	11.2
122	1.024	7.3	3.45	3.31	0.47	7.23	1.7	8.93
123	1.0273	7.0	4.15	4.15	0.54	8.84	2.3	11.14
124	1.025	6.5	4.25	3.35	0.44	8.04	1.76	9.8
125	1.0288	8.3	4.3	3.8	0.5	8.6	2.5	11.1
126	1.027	7.3	4.15	3.75	0.5	8.4	2.36	10.76
127	1.028	8.7	4.4	3.86	0.54	8.8	2.72	11.52
128	1.031	10.0	5.0	4.7	0.6	10.3	2.44	12.74
129	1.031	9.3	5.2	4.82	0.68	10.7	4.24	14.94
130	1.029	8.0	4.55	4.31	0.52	9.38	3.0	12.38
131	1.025	6.66	3.8	3.14	0.56	7.50	2.06	9.56
132	1.0305	8.0	5.0	4.12	0.58	9.7	2.82	12.52
133	1.0325	14.0	5.25	4.67	0.66	10.58	2.98	13.56
134	1.029	8.0	4.7	4.44	0.52	9.66	3.26	12.92
135	1.032	8.66	5.1	5.32	0.58	11.0	2.5	13.5
136	1.028	8.0	4.5	4.6	0.5	9.6	1.56	11.16
137	1.0302	6.66	4.9	4.68	0.54	10.12	1.92	12.04
138	1.031	4.0	4.6	4.3	0.6	9.5	1.14	10.64
139	1.0263	6.0	4.05	2.79	0.54	8.38	2.42	10.8
140	1.031	3.2	4.8	5.1	0.42	10.32	2.26	12.58
141	1.0285	6.0	5.05	4.45	0.72	10.22	4.14	14.36
142	1.0315	10.0	5.0	4.2	0.54	9.74	2.66	12.4
143	1.03	5.3	5.35	4.31	0.64	10.3	3.36	13.66
144	1.0225	25.3	4.4	4.04	0.44	8.88	7.36	16.24
145	1.0275	10.0	4.15	4.29	0.5	8.94	2.3	11.24

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
146	1.031	6.66	4.85	5.09	0.6	10.54	2.36	12.9
147	1.0275	4.66	4.15	4.47	0.34	8.96	1.76	10.72
148	1.0293	8.0	5.0	4.06	0.76	9.82	4.04	13.86
149	1.0272	6.0	3.9	4.844	0.42	9.164	1.1	10.264
150	1.027	2.3	4.65	6.75	0.56	11.86	3.5	14.36
151	1.03	7.4	4.35	4.05	0.56	8.96	1.9	10.86
152	1.024	6.0	4.3	3.5	0.6	8.4	2.44	10.84
153	1.0265	16.6	4.75	4.55	0.56	9.86	3.96	13.82
154	1.0235	5.3	3.65	2.99	0.36	7.0	1.86	8.86
155	1.026	2.0	3.95	3.03	0.6	7.58	0.76	8.34
156	1.029	5.0	3.75	2.75	0.40	6.9	1.4	8.3
157	1.028	6.0	4.4	4.04	0.4	8.84	1.92	10.76
158	1.029	6.66	4.4	4.46	0.64	9.5	1.5	11.0
159	1.03	8.0	4.9	4.44	0.66	10.0	2.56	12.56
160	1.029	8.5	4.6	4.0	0.64	9.24	2.36	11.6
161	1.029	5.3	4.6	4.26	0.7	9.56	2.76	12.32
162	1.028	9.3	4.35	5.33	0.6	10.28	1.52	11.8
163	1.0305	7.0	4.55	5.35	0.6	10.4	1.96	12.36
164	1.0295	6.0	4.55	5.07	0.64	10.26	2.56	12.82
165	1.0305	5.3	4.85	4.55	0.64	10.04	2.06	12.1
166	1.029	4.0	4.75	4.75	0.6	10.1	2.26	12.36
167	1.027	2.0	4.1	3.16	0.44	7.7	0.80	8.5
168	1.0315	6.0	4.8	4.72	0.48	10.0	1.56	11.56
169	1.03	3.0	4.4	4.22	0.6	9.22	0.7	9.92
170	1.029	12.0	4.7	5.18	0.66	10.54	2.38	12.92
171	1.026	4.5	3.75	3.45	0.46	7.66	1.32	8.98
172	1.03	4.0	4.5	3.9	0.64	9.04	1.68	10.72
173	1.03	10.0	5.0	5.14	0.54	10.68	3.12	13.8
174	1.026	10.5	5.0	5.14	0.54	10.68	3.12	13.8
175	1.0275	8.6	4.2	4.7	0.70	9.6	2.54	12.14
176	1.031	4.6	4.9	4.9	0.64	10.44	1.86	12.3
177	1.029	2.0	4.65	4.15	0.50	9.3	1.24	10.54
178	1.032	7.3	4.85	4.23	0.68	9.76	1.7	11.46
179	1.028	8.0	4.5	4.26	0.48	9.24	2.14	11.38
180	1.027	8.0	4.4	3.6	0.66	8.66	3.04	11.7
181	1.0275	6.0	4.4	3.7	0.52	8.62	2.42	11.0
182	1.0253	13.3	4.3	4.76	0.56	9.62	2.72	12.34

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumi-noids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
183	1.027	8.0	4.3	4.14	0.68	9.12	2.6	11.72
184	1.0275	5.3	4.35	3.71	0.58	8.64	2.02	10.66
185	1.026	6.6	4.25	4.01	0.48	8.74	2.06	10.8
186	1.03	10.7	4.9	5.44	0.66	11.0	1.94	12.94
187	1.031	8.0	5.3	5.02	0.7	11.02	2.52	13.54
188	1.0245	4.6	5.75	1.04	0.49	7.28	1.13	8.41
189	1.02	6.6	3.1	2.74	0.44	6.28	1.45	7.73
190	1.027	5.3	4.25	3.68	0.65	8.58	2.11	10.69
191	1.027	8.6	4.25	3.62	0.56	8.44	2.25	10.69
192	1.021	3.0	3.1	2.78	0.41	6.29	0.75	7.04
193	1.028	7.0	4.5	4.31	0.67	9.48	2.42	11.9
194	1.0305	10.6	4.9	4.29	0.64	9.85	2.5	12.35
195	1.022	24.0	4.25	3.48	0.64	8.37	7.34	15.71
196	1.077	6.0	4.25	3.76	0.67	8.68	1.62	10.3
197	1.031	3.3	5.0	3.85	0.65	9.5	0.68	10.18
198	1.03	8.0	4.4	3.27	0.64	8.31	1.12	9.43
199	1.026	8.0	4.25	4.13	0.65	9.03	1.39	10.42
200	1.022	10.0	3.55	3.22	0.51	7.28	2.22	9.50
201	1.03	6.0	4.5	4.87	0.64	10.01	1.14	11.15
202	1.0245	4.0	3.75	3.22	0.50	7.47	0.87	8.34
203	1.023	5.66	3.4	3.3	0.5	7.2	1.24	8.44
204	1.032	3.0	4.5	4.43	0.74	9.67	0.42	10.09
205	1.029	6.0	4.65	4.56	0.65	9.86	1.59	11.45
206	1.022	4.66	3.25	2.97	0.49	6.71	1.1	7.81
207	1.03	7.33	4.6	4.41	0.64	9.65	2.44	12.09
208	1.026	31.33	4.9	5.56	0.65	11.11	5.71	16.82
209	1.0292	8.0	4.75	4.17	0.77	9.69	2.49	12.18
210	1.031	2.66	4.65	3.69	0.58	8.92	0.62	9.54
211	1.0315	4.0	4.8	4.14	0.52	9.46	1.02	10.48
212	1.028	5.33	4.3	3.62	0.68	8.6	1.94	10.54
213	1.028	4.66	4.25	3.95	0.52	8.72	1.6	10.32
214	1.0255	5.33	3.92	3.16	0.6	7.68	2.0	9.68
215	1.028	8.33	4.5	3.52	0.6	8.62	3.08	11.7
216	1.031	6.0	5.0	3.66	0.62	9.28	2.6	11.88
217	1.03	4.66	4.75	3.61	0.62	8.98	1.8	10.78
218	1.0305	3.0	5.2	3.16	0.72	9.08	2.7	11.78
219	1.031	11.33	4.85	3.65	0.68	9.18	3.72	12.9

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
220	1.029	9.0	5.1	3.16	0.74	9.0	4.04	13.04
221	1.028	6.66	4.35	3.35	9.64	8.34	2.62	10.96
222	1.031	6.0	4.65	3.63	0.60	8.88	1.92	10.80
223	1.022	24.66	4.4	3.24	0.56	8.2	6.86	15.06
224	1.031	6.0	4.8	3.5	0.76	9.06	2.16	11.22
225	1.0305	7.33	4.95	3.35	0.9	9.2	2.82	12.02
226	1.031	5.33	4.8	3.96	0.66	9.42	2.16	11.58
227	1.029	9.0	5.0	4.0	0.76	9.76	3.44	13.2
228	1.029	14.0	4.75	4.03	0.64	9.42	4.52	13.94
229	1.029	5.33	4.91	3.63	0.64	9.28	2.96	12.24
230	1.032	24.66	5.3	4.68	0.7	10.68	2.56	13.14
231	1.0292	.0	4.25	5.83	0.6	8.36	0.2	8.56
232	1.03	10.66	4.9	3.9	0.64	9.44	4.46	13.9
233	1.033	5.33	5.35	4.17	0.66	10.18	3.74	13.92
234	1.023	5.0	3.5	3.0	0.48	6.98	1.54	8.52
235	1.031	6.66	4.7	3.58	9.68	8.96	1.82	10.78
236	1.025	10.66	4.05	2.85	0.88	7.78	2.72	10.5
237	1.031	9.0	4.75	4.11	0.74	9.6	2.3	11.9
238	1.031	8.0	5.0	4.28	0.64	9.92	2.76	12.68
239	1.031	9.0	5.0	4.3	0.70	10.0	3.2	13.2
240	1.029	15.33	3.9	4.82	0.84	9.56	4.1	13.66
241	1.032	8.66	4.6	3.64	0.76	9.00	2.32	11.32
242	1.0292	15.0	4.7	4.6	0.62	9.92	6.74	16.66
243	1.032	5.33	4.8	4.36	0.7	9.86	1.66	11.52
244	1.034	15.0	4.25	4.67	0.64	9.56	4.68	14.24
245	1.03	5.33	4.5	3.32	0.72	8.54	2.8	11.34
246	1.029	8.0	4.2	3.4	0.56	8.16	1.9	10.06
247	1.0285	11.33	4.35	3.75	0.7	8.8	2.9	11.7
248	1.03	5.0	4.45	3.47	0.66	8.58	1.74	10.32
249	1.032	7.0	4.9	3.96	0.68	9.54	2.14	11.68
250	1.0335	5.30	5.25	3.89	0.74	9.88	1.7	11.58
251	1.03	8.66	4.7	3.8	0.70	9.2	2.64	11.84
252	1.0305	7.0	4.6	4.8	0.7	9.1	2.14	11.24
253	1.03	8.66	4.8	3.9	0.7	9.4	3.14	12.54
254	1.03	6.0	4.8	3.86	0.64	9.3	2.94	12.24
255	1.029	8.0	4.65	4.01	0.76	9.42	2.88	12.3
256	1.03	8.66	4.7	4.08	0.62	9.4	2.72	12.12

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumi-noids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
257	1.0315	6.0	4.7	3.0	0.68	8.38	2.54	10.92
258	1.025	6.0	4.0	2.76	0.62	7.38	1.8	9.18
259	1.023	5.0	3.6	2.82	0.42	6.8	1.88	8.74
260	1.0205	11.33	3.4	2.46	0.46	6.32	3.3	9.62
261	1.031	4.0	4.75	3.75	0.52	6.02	1.4	10.42
262	1.021	6.3	3.5	2.84	0.48	6.82	2.06	8.88
263	1.0275	3.66	4.35	3.21	0.58	8.14	1.46	9.6
264	1.028	18.66	5.00	3.48	0.60	9.08	4.36	14.44
265	1.03	6.33	4.6	3.84	0.54	8.98	2.4	11.38
266	1.027	6.0	4.1	3.54	0.64	8.28	2.48	12.76
267	1.028	7.0	4.4	3.6	0.6	8.6	2.04	10.64
268	1.0305	8.0	4.8	4.04	0.68	9.52	2.54	12.06
269	1.03	24.	4.7	4.28	0.62	9.6	5.52	15.12
270	1.025	5.33	4.1	3.5	0.42	8.02	2.6	10.62
271	1.03	5.66	5.0	4.86	0.54	10.4	2.44	12.84
272	1.0265	9.0	4.25	4.33	0.54	9.12	3.46	12.58
273	1.029	6.0	4.8	3.98	0.6	9.38	3.74	13.02
274	1.0295	8.66	4.25	4.05	0.68	8.98	2.26	11.24
275	1.025	14.0	4.0	3.44	0.66	8.1	4.0	12.1
276	1.0278	8.66	4.4	3.78	0.6	8.78	3.82	12.6
277	1.035	2.66	4.65	3.89	0.62	9.16	1.42	10.58
278	1.0277	8.0	4.25	3.65	0.72	8.62	2.16	10.78
279	1.031	2.66	4.6	3.52	0.68	8.80	0.78	9.58
280	1.03	4.0	4.7	3.78	0.70	9.18	0.82	10.0
281	1.028	7.33	4.4	3.8	0.64	8.84	2.68	11.52
282	1.0275	20.0	4.8	4.46	0.74	10.0	6.04	16.04
*283	1.0287	13.33	4.9	3.96	0.8	9.66	5.7	15.36
*284	1.0287	6.0	4.9	3.6	0.72	9.22	4.36	13.58
*285	1.0315	6.0	5.25	3.89	0.72	9.66	3.3	12.96
*286	1.033	5.33	4.85	4.53	0.72	10.10	4.76	14.86
*287	1.03	7.0	5.0	4.12	0.6	9.72	4.42	14.14
*288	1.032	8.66	5.1	4.04	0.78	9.92	4.9	14.82
289	1.0308	10.	4.9	3.74	0.68	9.32	3.82	13.14
290	1.0305	5.33	4.5	4.24	0.8	9.54	2.46	12.0
291	1.03	8.66	4.8	4.24	0.7	9.74	3.66	13.4
292	1.0295	12.66	4.75	4.41	0.68	9.84	3.54	13.38
293	1.0295	4.0	4.75	4.21	0.7	9.66	2.09	12.56

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
294	1.0302	8.66	4.85	4.51	0.7	10.06	2.34	12.4
295	1.0315	4.0	4.7	3.46	0.64	8.8	0.84	9.64
296	1.031	3.33	4.6	3.5	0.56	8.66	0.8	9.46
297	1.0305	4.66	4.9	3.6	0.6	9.1	1.9	11.0
298	1.034	6.33	5.1	4.34	0.58	10.02	2.04	12.06
299	1.032	7.0	4.75	4.45	0.68	9.88	2.6	12.48
300	1.031	8.0	4.7	4.44	0.7	9.84	2.56	12.4
301	1.0305	7.0	4.8	3.78	0.66	9.24	2.06	11.3
302	1.03	7.66	5.1	3.98	0.52	9.6	3.12	12.72
303	1.03	4.66	4.75	3.39	0.6	8.74	2.0	10.74
304	1.018	35.33	4.3	2.88	0.52	7.70	9.44	17.14
305	1.0315	8.0	5.05	4.69	0.64	10.38	2.4	12.78
306	1.029	5.33	4.65	4.55	0.56	9.76	2.40	12.16
307	1.028	6.66	5.0	3.84	0.52	9.36	2.96	12.32
308	1.0293	9.66	4.65	4.45	0.56	9.66	3.04	12.7
309	1.03	13.0	4.75	4.93	0.64	10.32	3.6	13.92
310	1.031	10.0	4.6	4.08	0.66	9.34	2.9	12.24
311	1.032	8.0	4.9	4.0	0.66	9.56	3.0	12.56
312	1.0335	5.33	5.15	4.23	0.50	9.88	3.26	13.14
313	1.0285	6.0	4.4	3.74	0.48	8.62	2.16	10.78
314	1.0265	7.33	4.1	3.4	0.42	7.92	2.06	9.98
315	1.0315	10.0	4.8	5.36	0.58	10.74	3.52	14.26
316	1.031	8.0	4.85	4.31	0.64	9.8	2.5	12.3
317	1.032	8.66	4.85	5.09	0.54	10.48	2.86	13.34
318	1.031	13.33	4.75	5.13	0.5	10.38	2.72	13.1
319	1.031	6.0	4.6	4.78	0.66	10.04	2.52	12.56
320	1.03	10.66	4.8	4.78	0.6	10.18	3.66	13.84
321	1.027	6.0	4.3	3.76	0.6	8.66	2.66	11.32
322	1.0265	7.33	4.5	3.56	0.58	8.64	3.14	11.78
323	1.0285	1.66	4.25	3.39	0.62	8.26	1.4	9.66
324	1.031	5.0	4.75	3.85	0.6	9.2	2.4	11.6
325	1.0273	8.0	4.2	3.94	0.54	8.68	2.54	11.22
326	1.0265	6.0	4.0	4.34	0.54	8.88	1.3	10.18
327	1.0305	13.33	5.15	4.45	0.6	10.2	2.34	12.54
328	1.029	4.0	4.25	3.57	0.62	8.44	1.56	10.0
329	1.022	23.0	3.6	3.88	0.46	7.94	3.44	11.38
330	1.028	4.0	4.4	4.2	0.70	9.3	2.48	11.78

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumi-noids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
331	1.028	6.33	4.9	4.48	0.78	10.16	0.7	10.86
332	1.0298	9.0	4.5	4.66	0.52	9.68	2.7	12.38
333	1.0325	3.0	4.9	3.94	0.62	9.46	0.3	9.76
334	1.0325	3.0	4.85	4.09	0.58	9.52	0.12	9.68
335	1.032	8.0	5.15	4.61	0.52	10.28	1.78	12.06
336	1.03	17.0	5.4	4.68	0.6	10.68	4.38	15.06
337	1.030	6.66	4.5	4.54	0.56	9.6	2.22	11.82
338	1.0305	10.0	5.0	4.36	9.54	9.9	3.7	13.6
339	1.026	20.0	4.50	4.0	0.52	9.02	5.58	14.6
340	1.0275	9.0	5.05	3.15	0.50	8.7	2.78	11.48
341	1.029	16.66	4.35	5.01	0.62	9.98	4.9	14.88
342	1.0318	8.66	4.75	4.27	0.78	9.8	3.64	13.44
343	1.0265	10.0	4.55	3.69	0.6	8.84	3.64	12.48
344	1.026	32.66	4.825	4.375	0.6	9.80	7.74	17.54
345	1.0305	1.0	4.6	4.4	0.66	9.66	0.98	10.64
346	1.029	10.0	4.75	4.51	0.72	9.98	2.88	12.86
347	1.031	8.66	5.25	4.33	0.66	10.24	2.32	12.56
348	1.03	14.66	5.0	4.26	0.58	9.84	3.68	13.52
349	1.0315	13.0	4.5	3.1	0.8	8.4	4.96	13.36
†350	. . .	100.0	. . .	. . .	0.5	8.86	39.4	51.74
351	1.0293	5.66	4.75	2.49	0.46	7.70	0.66	8.36
352	1.0265	2.0	3.9	4.58	0.6	9.08	2.12	11.2
353	1.0258	4.0	3.75	3.65	0.54	7.94	1.5	9.44
354	1.0285	4.0	4.45	3.91	0.78	9.14	1.4	10.54
355	1.0275	7.0	4.55	4.15	0.54	9.24	2.56	11.8
356	1.0282	8.66	4.7	4.0	0.7	9.4	2.58	11.98
357	1.0283	8.0	4.65	4.15	0.6	9.4	2.2	11.6
358	1.032	1.33	4.8	3.86	0.56	9.22	0.76	10.08
359	1.0298	12.66	4.9	4.16	0.64	9.7	3.38	13.08
360	1.0293	9.33	4.95	4.53	0.7	10.18	3.42	13.6
361	1.0303	10.0	4.95	4.07	0.82	9.84	3.42	13.26
†362	1.015	78.0	4.3	3.08	0.52	7.9	13.66	21.56
363	1.0312	9.33	4.85	4.43	0.78	10.06	3.44	13.5
364	1.0298	8.0	4.75	3.95	0.58	9.28	2.66	11.94
365	1.031	7.0	4.95	4.13	0.76	9.84	0.72	10.56
366	1.027	8.0	4.2	3.46	0.74	8.4	2.44	10.84
367	1.0295	7.33	4.4	4.12	0.76	9.28	1.86	11.14

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
368	1.03	6.0	4.75	4.25	0.62	9.62	2.06	11.68
369	1.0295	10.0	4.8	4.0	0.54	9.34	2.90	12.24
370	1.0275	9.33	4.35	3.65	0.64	8.64	2.76	11.40
371	1.031	4.66	4.675	4.025	0.72	9.42	1.46	10.88
372	1.029	11.66	4.85	3.71	0.74	9.3	2.84	12.14
373	1.030	9.0	4.8	4.22	0.64	9.66	2.9	12.56
374	1.0325	3.0	4.85	4.09	0.58	9.52	0.12	9.64
375	1.0312	13.0	5.0	4.38	0.6	9.98	3.14	13.12
376	1.032	9.0	4.8	4.44	0.7	9.9	2.8	12.7
377	1.030	7.0	4.7	4.68	0.64	10.02	1.56	11.58
378	1.031	9.0	4.95	4.17	0.76	9.88	2.02	11.9
379	1.0285	12.0	4.7	3.68	0.64	9.02	2.74	11.76
380	1.030	10.0	4.8	4.62	0.72	10.14	2.34	12.48
381	1.0302	11.33	4.75	3.79	0.54	9.08	2.96	12.04
382	1.0345	1.0	5.25	3.79	0.6	9.64	0.52	10.16
383	1.0312	8.0	4.85	4.21	0.54	9.6	2.64	12.24
384	1.0302	7.0	4.8	4.04	0.7	9.54	2.76	12.3
385	1.03	9.0	4.9	3.82	0.56	9.28	1.84	11.12
386	1.029	8.0	4.45	4.01	0.68	9.14	1.84	10.98
387	1.031	6.66	4.85	4.05	0.74	9.64	2.04	11.68
388	1.031	4.66	5.05	4.33	0.54	9.92	2.62	12.54
389	1.029	9.0	4.80	4.04	0.6	9.44	3.16	12.6
390	1.0295	10.66	4.65	4.13	0.56	9.34	2.56	11.9
391	1.0292	4.0	4.65	3.41	0.64	8.7	1.54	10.24
392	1.031	5.0	4.9	4.44	0.7	10.04	2.04	12.08
393	1.0317	5.35	5.05	4.25	0.56	9.86	1.64	11.5
394	1.0275	10.0	4.35	3.91	0.7	8.96	2.68	11.64
395	1.0302	13.0	5.15	3.73	0.6	9.48	2.94	12.42
396	1.029	10.66	4.85	4.27	0.52	9.64	3.4	13.04
397	1.030	6.0	5.0	4.22	0.72	9.94	3.46	13.4
398	1.0255	11.33	4.15	3.93	0.54	8.62	2.32	10.94
399	1.032	1.33	5.1	4.84	0.76	10.7	10.4	11.74
400	1.0302	4.0	4.75	4.19	0.62	9.56	1.4	10.96
401	1.0287	8.0	4.575	4.265	0.54	9.38	3.04	12.42
402	1.0287	7.0	4.75	4.21	0.66	9.62	2.9	12.52
403	1.0287	7.0	4.6	4.14	0.5	9.24	2.24	11.48
404	1.0275	1.80	4.825	4.135	0.7	9.66	4.80	14.46

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumi-noids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total, Solids.
405	1.027	3.0	4.35	2.91	0.64	7.9	2.14	10.04
406	1.027	4.0	4.15	3.05	0.6	7.8	1.74	9.54
407	1.0278	13.66	4.7	3.9	0.66	9.26	3.44	12.7
†408	1.018	63.33	4.35	3.25	0.46	8.06	13.88	21.94
409	1.03	6.0	4.55	4.39	0.64	9.58	0.52	10.10
410	1.03	8.0	4.7	3.58	0.80	9.08	2.22	11.3
411	1.0305	13.66	5.1	4.3	0.30	10.2	4.84	15.04
412	1.0282	8.0	4.9	3.06	0.64	8.6	3.04	11.64
413	1.0285	10.0	5.0	3.06	0.5	8.56	3.1	11.66
414	1.0273	9.33	4.6	3.54	0.66	8.8	2.76	11.56
415	1.0305	9.33	5.45	4.47	0.46	10.38	2.44	12.82
416	1.0315	6.0	4.775	4.045	0.68	9.50	2.1	11.6
417	1.0315	8.66	4.75	4.47	0.58	9.8	2.9	12.7
418	1.025	4.66	5.05	2.15	0.4	7.6	1.86	9.46
419	1.029	12.0	4.35	4.97	0.56	9.88	3.38	13.26
420	1.0293	5.33	5.05	3.83	0.46	9.34	4.36	13.7
421	1.030	8.66	4.85	3.99	0.66	9.5	2.7	12.2
422	1.03	9.33	5.05	3.81	0.74	9.60	3.8	13.4
423	1.029	13.33	5.05	3.61	0.74	9.4	3.2	12.6
424	1.0285	12.5	4.85	3.85	0.72	9.42	2.76	12.18
425	1.026	3.0	4.2	3.7	0.66	8.56	1.6	10.16
426	1.031	3.0	4.8	3.58	0.62	9.0	0.9	9.90
427	1.0305	10.66	5.075	4.3	0.56	9.94	2.74	12.68
428	1.0255	8.66	4.65	2.81	0.48	7.94	2.32	10.26
429	1.032	10.66	5.1	4.56	0.58	10.24	2.5	12.74
430	1.0297	8.0	4.85	4.03	0.62	9.50	3.2	12.7
431	1.026	5.0	4.55	3.29	0.66	8.50	1.54	10.04
432	1.031	7.0	4.825	4.63	0.62	10.08	1.66	11.74
433	1.029	6.33	4.95	4.03	0.62	9.6	1.64	11.24
434	1.026	11.33	4.75	3.73	0.68	9.16	3.44	12.6
435	1.0332	6.66	5.75	5.23	0.62	11.6	0.66	12.26
436	1.032	12.66	4.85	4.53	0.78	10.16	2.92	13.08
437	1.302	8.0	4.85	4.01	0.64	9.5	3.04	12.54
438	1.032	5.0	5.225	3.83	0.74	9.8	2.0	11.8
439	1.0265	7.33	4.4	3.62	0.6	8.62	2.74	11.36
440	1.0312	7.66	5.5	3.9	0.66	10.06	2.68	12.74
441	1.0295	10.0	4.60	3.96	0.64	9.2	3.1	12.3

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
442	1.0288	6.0	4.4	3.52	0.58	8.5	2.5	11.04
443	1.0292	9.33	4.65	4.47	0.68	9.8	2.38	12.18
444	1.029	7.0	4.75	4.25	0.54	9.54	2.46	12.0
445	1.030	4.0	5.35	3.63	0.58	9.56	3.56	16.12
446	1.029	4.66	4.3	4.1	0.62	9.02	1.66	10.68
†447	1.022	58.0	4.6	3.82	0.5	8.92	11.78	20.70
448	1.0315	9.0	5.05	4.45	0.52	10.02	3.386	13.306
449	1.03	9.0	4.775	4.525	0.7	10.0	3.18	13.18
450	1.0305	4.66	4.55	4.17	0.58	9.3	1.58	10.88
451	1.03	5.0	4.55	3.61	0.7	8.86	2.0	10.86
452	1.029	9.33	4.05	4.13	0.82	9.0	2.64	11.64
453	1.0375	7.66	4.9	3.96	0.7	9.56	2.94	12.5
454	1.0315	2.0	4.75	4.03	0.62	9.40	1.6	11.0
455	1.029	5.66	4.7	3.58	0.66	8.94	2.16	11.1
456	1.0307	7.0	5.0	4.0	0.6	9.6	2.1	11.7
457	1.0305	13.0	5.0	4.42	0.74	10.16	3.76	13.92
458	1.0245	24.0	4.95	2.93	0.56	8.44	5.22	13.66
459	1.0305	4.0	4.85	4.19	0.54	9.58	1.46	11.04
460	1.0263	4.66	4.1	2.24	0.66	7.70	2.04	9.74
461	1.0298	6.0	4.65	3.35	0.54	8.54	2.62	11.16
462	1.0302	7.0	4.75	3.55	0.5	8.8	2.22	11.02
463	1.034	4.0	5.225	3.975	0.8	10.0	1.76	11.76
464	1.0322	5.0	4.8	3.84	0.46	9.1	2.0	11.1
465	1.0305	9.0	4.65	3.49	0.62	8.76	3.34	12.1
466	1.032	6.0	5.05	3.71	0.82	9.58	2.52	12.1
467	1.03	6.0	4.5	3.22	0.68	8.4	2.2	10.6
468	1.03	5.66	4.40	4.06	0.66	9.12	1.8	10.92
469	1.032	7.0	5.1	3.94	0.56	9.6	2.84	12.44
†470	1.0215	93.3	4.7	6.4	0.72	11.82	18.1	29.92
471	1.031	6.66	4.75	4.11	0.64	9.50	2.64	12.14
†472	1.029	20.0	4.95	3.39	0.52	8.86	5.6	14.46
473	1.03	4.66	4.35	3.89	0.56	8.80	1.6	10.40
†474	1.029	20.0	4.85	4.45	0.5	9.8	5.0	14.8
475	1.024	11.66	4.2	3.02	0.58	7.8	3.14	10.94
476	1.0305	10.66	4.85	4.05	0.66	9.56	1.16	10.72
477	1.024	8.0	4.4	2.36	0.54	7.3	2.96	10.26
478	1.0305	10.66	4.85	4.05	0.66	9.56	1.16	10.72

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
479	1.028	8.0	4.65	3.31	0.54	8.5	2.3	10.8
480	1.025	6.0	4.4	2.86	0.48	7.74	1.94	9.68
481	1.035	2.0	5.35	3.67	0.8	9.82	0.84	10.66
482	1.028	9.33	4.8	3.66	0.64	9.1	3.3	12.4
483	1.0307	2.0	4.5	3.6	0.5	8.6	0.7	9.3
484	1.0305	6.33	5.05	3.01	0.46	8.52	3.54	12.06
485	1.0308	8.0	5.05	4.07	0.58	9.7	3.04	12.74
*486	1.03	8.66	4.9	4.2	0.52	9.62	3.7	13.32
487	1.0287	8.66	4.675	3.68	0.44	8.8	2.46	11.26
488	1.0305	4.66	4.9	4.04	0.56	9.5	2.52	12.02
489	1.0305	4.66	5.1	4.1	0.58	9.78	2.7	12.48
490	1.0388	6.0	4.7	3.84	0.5	9.04	2.6	11.64
491	1.0305	6.0	4.9	4.56	0.5	9.96	4.06	14.02
492	1.0285	13.0	4.6	3.76	0.58	8.94	4.06	13.0
493	1.032	8.0	5.025	4.035	0.7	9.76	3.5	13.26
494	1.0318	7.33	5.0	4.2	0.6	9.8	2.74	12.54
495	1.028	6.0	4.45	3.79	0.54	8.78	2.3	11.08
496	1.031	7.33	4.90	4.04	0.6	9.54	2.22	11.76
497	1.03	7.0	4.9	3.76	0.5	9.16	3.1	12.26
498	1.0325	4.66	5.0	4.3	0.64	9.94	1.7	11.64
499	1.023	12.66	4.1	2.66	0.46	7.22	3.04	10.26
500	1.034	10.0	4.85	4.71	0.64	10.62	2.58	13.2
501	1.0315	10.66	4.05	5.15	0.66	9.86	2.8	12.66
502	1.030	8.66	4.25	4.45	0.64	9.34	3.06	12.4
503	1.031	4.0	4.85	4.45	0.66	9.96	2.34	12.3
504	1.0305	11.33	4.8	3.3	0.7	8.8	3.94	12.74
505	1.029	12.0	4.775	3.625	0.54	8.94	4.24	13.18
506	1.0325	8.66	4.75	4.94	0.56	10.2	2.8	13.0
507	1.0305	12.0	4.85	3.61	0.7	9.16	4.4	13.56
508	1.03	10.66	4.9	4.5	0.6	9.0	3.74	12.74
509	1.0325	8.0	4.8	4.26	0.74	9.8	3.0	12.8
510	1.029	11.33	4.6	4.26	0.68	9.54	3.14	12.68
511	1.030	6.66	4.55	4.21	0.64	9.40	3.0	12.4
512	1.0297	6.66	4.33	4.73	0.6	9.66	2.92	12.58
513	1.0305	10.0	4.8	4.2	0.7	9.7	4.16	13.86
514	1.0305	6.66	4.7	4.24	0.6	9.54	1.94	11.48
515	1.0312	8.6	4.66	4.46	0.8	9.92	2.62	12.54

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids not fat.	Fat.	Total Solids.
516	1.03	9.33	4.75	4.19	0.6	9.54	2.8	12.34
517	1.0288	13.0	4.95	3.39	0.62	8.96	4.24	13.2
518	1.031	4.66	4.8	4.08	8.8	9.68	2.32	12.0
519	1.0255	5.33	3.85	3.37	0.54	7.76	1.98	9.74
520	1.028	10.0	4.9	3.44	0.6	8.94	3.8	12.74
521	1.0265	8.33	4.6	3.0	0.56	8.16	2.26	10.42
522	1.031	6.0	4.8	3.72	0.64	9.16	2.74	11.9
523	1.030	4.0	4.55	5.35	0.7	10.6	3.436	14.036
524	1.0375	8.0	4.8	5.12	0.66	10.58	3.8	14.38
525	1.0257	4.0	3.9	3.8	0.58	8.28	1.35	9.63
526	1.026	24.66	4.6	4.1	0.66	9.36	6.0	15.36
527	1.030	6.66	5.0	3.46	0.64	9.1	2.9	12.0
528	1.027	8.66	4.2	4.1	0.6	8.9	2.5	11.4
529	1.03	4.66	4.6	4.0	0.74	9.34	2.76	12.1
530	1.029	12.33	4.55	4.43	0.66	9.64	4.16	13.8.
531	1.027	12.0	4.45	3.55	0.7	8.7	2.88	11.58
532	1.0313	8.0	5.2	4.14	0.74	10.08	3.34	13.42
533	1.0275	8.0	4.65	3.85	0.6	9.1	3.84	12.94
534	1.0298	10.0	4.45	4.49	0.66	9.6	2.46	12.06
535	1.029	14.0	4.3	5.44	0.6	10.34	2.9	13.24
536	1.0305	3.0	4.6	3.8	0.5	8.9	1.5	10.4
537	1.0245	36.66	4.75	3.55	0.7	9.0	9.94	18.94
538	1.0315	7.33	4.7	4.18	0.72	9.6	3.24	12.84
539	1.0335	2.0	4.65	4.79	0.76	10.2	0.9	11.1
540	1.030	10.0	4.6	4.4	0.6	9.6	3.24	12.84
541	1.027	4.66	4.0	3.42	0.66	8.08	1.26	9.34
542	1.028	13.33	4.45	3.99	0.5	8.94	3.74	12.68
543	1.029	7.33	4.2	4.16	0.74	9.00	2.2	11.2
544	1.0285	6.66	4.2	4.14	0.5	8.84	3.06	11.9
545	1.025	7.33	4.05	2.95	0.6	7.6	1.8	9.4
546	1.0285	4.33	3.525	4.54	0.84	8.9	0.86	9.76
547	1.029	5.33	4.25	4.07	0.8	9.12	2.08	11.2
548	1.03	8.0	4.7	3.86	0.7	9.26	3.0	12.26
549	1.018	48.0	3.85	2.51	0.64	7.0	9.1	16.10
550	1.0295	7.0	4.50	4.36	0.58	9.44	2.7	12.14
*551	1.0277	20.0	4.65	5.01	0.64	10.3	6.2	16.5
552	1.031	16.0	4.9	4.52	0.68	10.00	5.04	15.14

ANALYSIS. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids not fat.	Fat.	Total Solids.
553	1.0303	7.33	4.725	4.075	0.66	9.46	2.8	12.26
554	1.0297	8.0	4.925	3.93	0.74	9.6	3.1	12.7
555	1.0305	7.33	4.95	3.89	0.7	9.54	3.12	12.66
556	1.029	4.66	4.6	3.5	0.7	8.8	2.2	11.0
557	1.0308	8.33	5.05	4.05	0.74	9.84	3.04	12.88
558	1.029	14.0	4.4	4.34	0.7	9.44	4.06	13.5
559	1.029	6.0	4.5	5.46	0.6	10.56	1.88	12.44
560	1.0295	2.0	4.75	4.61	0.54	9.90	1.94	11 84
561	1.0315	3.0	4.6	3.86	0.7	9.16	1.9	11.06
562	1.032	7.33	4.8	4.2	0.66	9.66	3.5	13.16
563	1.033	7.66	4.6	3.84	0.76	9.2	3.2	12.4
564	1.032	5.66	5.0	4.26	0.66	9.92	2.74	12.66
565	1.0305	10.66	4.75	4.41	0.64	9.8	3.2	13.0
566	1.0275	14.66	4.0	3.66	0.68	8.34	3.6	11.94
567	1.0325	7.0	4.8	4.14	0.76	9.7	2.7	12.4
568	1.0295	6.66	4.4	3.86	0.6	8.86	2.64	11.5
569	1.0205	20.0	3.0	3.36	0.34	6.7	5.3	12.0
570	1.0295	7.0	4.1	3.84	0.62	8.56	1.84	10.4
571	1.0265	8.66	4.0	3.96	0.54	8.50	2.34	10.84
572	1.0265	6.66	4.05	3.75	0.52	8.32	2.0	10.32
573	1.028	4.66	4.05	3.55	0.54	8.14	1.74	9.88
574	1.0275	12.00	4.05	4.31	0.7	9.06	3.24	12.3
575	1.0302	14.0	5.15	3.41	0.66	9.12	3.98	13.1
576	1.028	4.66	4.15	3.19	0.82	8.16	1.36	9.52
577	1.028	15.0	4.55	3.57	0.84	8.96	4.54	13.5
578	1.033	16.66	5.05	4.47	0.8	10.32	4.98	15.3
579	1.032	6.33	4.95	3.59	0.74	9.28	2.16	11.44
580	1.031	6.66	5.0	3.78	0.76	9.54	2.9	12.44
581	1.0305	10.0	4.6	3.9	0.8	9.3	3.54	12.84
582	1.032	10.0	4.95	3.69	0.76	9.4	2.96	12.36
583	1.03	7.0	4.9	3.6	0.8	9.3	2.58	11.88
584	1.03	8.66	4.7	3.72	0.6	9.02	3.38	12.4
585	1.03	10.0	5.0	3.36	0.64	9.00	3.18	12.18
586	1.031	11.33	4.25	4.11	0.64	9.0	3.0	12.0
587	1.031	6.66	4.6	4.16	0.76	9.52	3.8	13.32
588	1.0302	12.0	4.25	4.47	0.68	9.4	4.2	13.6
589	1.031	10.0	4.25	4.51	0.8	9.56	3.6	13.16

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
590	1.0275	6.0	4.1	3.4	0.7	8.2	2.2	10.4
591	1.03	8.0	4.25	3.95	0.62	8.82	3.36	12.18
592	1.0305	11.33	4.09	3.26	0.74	8.9	3.8	12.7
593	1.031	5.33	4.7	3.5	0.7	8.9	2.76	11.66
594	1.029	3.33	4.25	3.55	0.6	8.4	1.2	9.6
595	1.03	10.0	4.75	4.09	0.78	9.62	2.7	12.32
596	1.0315	4.66	5.1	3.6	0.8	9.5	2.1	11.6
597	1.031	10.0	5.0	4.1	0.7	9.80	3.16	12.96
598	1.0325	6.66	4.9	3.7	0.7	9.30	2.5	11.8
599	1.032	3.33	4.3	4.46	0.78	9.54	1.8	11.34
600	1.032	6.0	4.65	3.55	0.66	8.86	2.94	11.8
601	1.0325	2.0	4.7	3.88	0.78	9.36	0.36	9.72
602	1.031	8.66	4.55	4.33	0.66	9.54	2.94	12.48
603	1.0285	7.0	4.3	3.88	0.52	8.70	2.82	11.52
604	1.028	6.66	4.4	3.98	0.72	9.1	2.62	11.72
605	1.028	12.5	4.0	3.68	0.76	8.44	3.12	12.56
606	1.0255	10.0	4.1	3.24	0.66	8.0	4.02	12.02
607	1.0275	10.6	4.55	3.29	0.74	8.58	2.96	11.54
608	1.0305	8.0	4.65	4.25	0.07	9.60	2.3	11.9
609	1.029	6.0	4.3	4.04	0.7	9.04	2.36	11.4
610	1.026	33.33	4.45	4.21	0.6	9.26	7.74	17.0
611	1.0305	6.0	5.05	3.75	0.76	9.56	2.64	12.2
612	1.0235	40.0	4.8	2.84	0.6	8.24	9.66	17.9
613	1.025	5.0	3.45	3.43	0.5	7.38	1.82	9.2
614	1.025	25.0	4.55	3.55	0.74	8.84	6.94	15.78
615	1.030	6.66	4.65	3.61	0.66	8.92	3.06	11.98
616	1.029	7.66	4.8	3.28	0.74	8.82	3.04	11.86
617	1.0295	6.66	5.05	3.01	0.78	8.84	2.94	11.78
618	1.0283	12.0	4.65	3.35	0.74	8.74	4.26	13.1
619	1.023	5.33	3.05	3.15	0.56	6.76	2.28	9.04
620	1.030	10.0	4.5	3.9	0.74	9.14	3.56	12.7
621	1.0235	19.33	4.15	3.31	0.54	8.0	6.64	14.64
622	1.024	16.33	4.55	3.75	0.7	9.0	6.54	15.54
623	1.031	4.66	4.45	4.03	0.8	9.28	3.0	12.28
624	1.0265	18.0	4.75	3.09	0.6	8.44	5.16	13.6
625	1.0275	10.66	4.5	4.0	0.66	9.16	3.9	13.06
626	1.027	9.33	4.0	4.64	0.76	9.40	2.02	11.42

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumi-noids (Caseine, etc).	Ash.	Sclids, not fat.	Fat.	Total Solids.
627	1.03	9.33	4.5	3.5	0.72	8.72	4.04	12.76
628	1.0303	8.0	4.7	4.4	0.5	9.60	2.32	11.92
629	1.0285	4.66	4.2	4.32	0.64	9.16	1.74	10.9
630	1.029	4.66	4.25	4.25	0.62	9.12	1.48	10.60
631	1.029	6.66	4.85	3.63	0.58	9.06	2.22	11.28
632	1.0295	10.0	4.24	4.6	0.6	9.44	3.44	12.88
†633	1.0065	95.0	4.0	4.68	0.48	9.16	19.28	28.44
634	1.0265	10.0	5.00	3.08	0.5	8.58	3.8	12.38
635	1.0295	9.33	5.0	3.24	0.66	8.9	3.22	12.12
636	1.031	4.0	4.9	3.6	0.76	9.26	2.44	11.7
637	1.03	13.33	5.05	3.29	0.76	9.10	4.16	13.26
638	1.025	33.0	4.05	3.99	0.6	8.64	7.16	15.8
639	1.0273	10.0	4.1	3.64	0.6	8.34	2.5	10.84
640	1.029	12.5	4.9	3.74	0.6	9.24	4.1	13.34
641	1.033	7.33	5.0	4.6	0.66	10.26	3.5	13.76
642	1.031	6.0	4.85	4.37	0.64	9.86	3.16	13.02
643	1.032	7.0	4.4	4.06	0.68	9.14	3.46	12.6
644	1.03	10.0	4.2	4.6	0.7	9.5	2.2	11.7
†645	1.017	95.0	4.25	3.19	0.6	8.04	14.9	22.94
646	1.032	6.0	4.55	4.41	0.64	9.6	2.2	11.8
647	1.028	12.0	4.45	3.83	0.6	8.88	3.3	12.18
648	1.030	8.0	4.95	3.61	0.6	9.16	2.4	11.56
649	1.03	8.0	4.8	3.7	0.74	9.24	2.6	11.84
650	1.029	13.0	4.75	4.15	0.56	9.46	4.44	13.9
651	1.03	8.66	4.75	3.85	0.64	9.24	3.86	13.1
652	1.0285	2.0	4.15	3.75	0.66	8.56	1.2	9.76
653	1.022	4.66	3.35	2.95	0.48	6.78	1.32	8.1
654	1.028	8.0	4.5	3.32	0.58	8.40	2.5	10.9
655	1.030	6.0	4.4	3.78	0.56	8.74	2.42	11.16
656	1.032	6.66	4.95	3.63	0.76	9.34	2.92	12.26
657	1.028	9.0	4.1	3.62	0.48	8.2	3.54	11.74
658	1.03	10.0	4.65	4.01	0.58	9.24	3.76	13.0
659	1.0275	6.66	4.1	3.96	0.54	8.6	2.58	11.18
660	1.0275	10.0	4.15	4.25	0.62	9.02	2.84	11.86
661	1.032	4.0	4.7	3.98	0.62	9.3	1.58	10.88
662	1.032	8.0	4.75	3.91	0.84	9.50	2.68	12.18
663	1.0315	8.0	5.1	3.8	0.66	9.56	2.28	11.84

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc).	Ash.	Solids, not fat.	Fat.	Total Solids.
664	1.031	15.33	5.2	4.14	0.62	9.96	2.14*	12.1
665	1.03	5.33	4.8	3.76	0.64	9.2	2.5	11.7
666	1.0315	4.66	2.05	1.99	0.3	4.34	1.54	5.88
667	1.0325	8.0	4.85	3.71	0.54	9.1	2.3	11.4
668	1.0308	11.33	4.45	3.95	0.8	9.2	2.82	12.02
669	1.0315	8.0	4.75	4.45	0.74	9.94	2.7	12.64
670	1.0325	9.0	5.0	4.36	0.74	10.1	4.64	14.74
671	1.0295	10.0	4.2	4.46	0.74	9.4	2.54	11.94
672	1.0288	58.0	4.25	4.35	0.64	9.24	6.34	15.58
673	1.027	6.0	3.9	3.64	0.6	8.14	3.0	11.14
674	1.029	3.0	3.9	4.12	0.58	8.6	1.34	9.94
675	1.0305	8.0	4.65	4.21	0.7	9.56	3.84	13.4
676	1.0302	13.33	4.6	4.22	0.8	9.62	3.44	13.06
677	1.029	13.0	4.8	4.52	0.74	10.06	4.2	14.26
*678	1.033	13.33	4.95	5.05	0.7	10.7	3.5	14.2
679	1.0297	7.0	4.9	3.4	0.66	8.96	3.2	12.16
680	1.0283	7.33	4.55	3.25	0.56	8.36	3.1	11.46
681	1.029	8.0	4.85	3.29	0.7	8.84	2.12	10.96
682	1.024	8.0	3.5	3.0	0.6	7.1	2.6	9.7
683	1.03	7.66	4.50	3.56	0.64	8.7	3.14	11.84
684	1.029	7.33	4.45	3.65	0.54	8.64	2.7	11.34
685	1.029	10.66	4.4	4.5	0.72	9.62	2.98	12.6
686	1.03	7.33	4.35	4.11	0.76	9.22	2.38	11.6
687	1.03	7.66	4.45	4.15	0.66	9.26	2.68	11.94
688	1.026	9.33	3.85	3.31	0.46	7.62	2.8	10.42
689	1.029	8.0	4.25	3.55	0.6	8.4	3.06	11.46
690	1.026	13.33	3.7	3.66	0.58	7.94	3.56	11.5
691	1.031	6.0	4.25	4.39	0.7	9.34	1.82	11.16
692	1.0308	8.66	4.70	4.06	0.54	9.3	3.08	12.38
693	1.0305	8.0	4.5	4.0	0.88	9.38	3.32	12.7
694	1.030	6.0	4.7	3.6	0.84	9.14	2.72	11.86
695	1.0308	4.0	4.65	3.97	0.6	9.22	1.8	11.52
696	1.0305	10.0	4.70	4.34	0.62	9.66	2.24	11.9
697	1.0308	10.66	5.1	4.3	0.6	10.0	2.54	12.54
698	1.031	8.66	4.5	3.92	0.7	9.12	2.3	11.42
699	1.031	10.66	4.65	4.35	0.6	9.6	2.7	12.3
700	1.0308	7.0	4.55	3.85	0.66	9.06	2.34	11.4

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
701	1.031	8.0	4.5	4.1	0.74	9.34	1.9	11.24
702	1.032	6.66	4.6	4.74	0.6	9.94	2.56	12.5
703	1.0322	9.33	4.75	4.45	0.82	10.02	3.02	13.04
704	1.034	3.0	4.75	3.99	0.8	9.54	0.3	9.84
705	1.03	13.33	4.65	4.11	0.64	9.4	4.26	13.66
706	1.031	8.0	4.76	4.0	0.72	9.42	2.04	11.46
707	1.032	8.0	4.85	4.39	0.7	9.94	2.56	12.5
708	1.0308	3.33	4.3	3.54	0.54	8.38	0.3	8.68
709	1.0273	7.3	4.15	3.79	0.62	8.56	2.6	11.16
710	1.027	8.0	3.9	3.6	0.56	8.06	2.56	10.62
711	1.0318	5.3	4.7	4.68	0.66	10.04	2.46	12.5
712	1.031	10.0	4.75	4.19	0.62	9.56	3.48	13.04
713	1.031	3.3	4.75	3.89	0.66	9.3	2.2	11.5
714	1.0232	4.0	3.65	2.65	0.54	6.84	1.3	8.14
715	1.0285	6.0	4.95	3.75	0.7	9.4	3.1	12.5
716	1.0295	9.30	4.9	3.88	0.62	9.4	3.26	12.66
†717	1.0175	82.6	4.75	2.97	0.6	8.32	15.24	23.56
718	1.031	6.60	5.05	3 59	0.66	9.3	3.5	12.8
719	1.0295	9.3	4.85	5.13	0.6	70.58	2.72	13.3
720	1.0325	7.33	4.8	4.3	0.62	9.72	3.2	12.92
721	1.0304	6.66	4.35	4.51	0.76	9.62	2.0	11.62
722	1.0305	7.33	4.60	3.9	0.56	9.06	2.8	11.86
723	1.0305	8.66	4.6	4.58	0.56	9.74	2.72	12.46
724	1.03	13.0	4.8	3.6	0.64	9.04	3.7	12.74
725	1.033	9.33	4.957	4.293	0.82	10.06	3.28	13.34
726	1.0313	8.0	4.9	3.94	0.76	9.6	2.46	12.06
727	1.0275	4.66	4.05	3.25	0.66	7.96	1.68	9.64
728	1.0285	4.66	4.05	4.45	0.8	8.30	1.92	10.22
729	1.0273	15.0	4.95	3.21	0.54	8.7	3.64	12.34
730	1.029	13.0	4.9	3.1	0 6	8.60	3.6	12.2
731	1.0313	8.66	5.2	4.32	0.54	10.06	3.5	13.86
732	1.0283	7.0	4.55	3.71	0.58	8.84	3.6	12.44
733	1.0305	10.66	4.45	4.15	0.62	9.22	3.1	12.32
734	1.0285	6.0	4.1	3.72	0.62	8.42	2.5	10.92
735	1.0328	7.33	4.87	4.23	0.66	8.76	2.6	12.36
736	1.0328	7.0	5.05	4 55	0.66	10.26	3.44	13.7
737	1.027	8.0	4.0	3.54	0.5	8.04	2.46	10.5

ANALYSES.— *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
738	1.0325	3.33	4.75	4.41	0.66	9.82	1.52	11.34
739	1.028	7.0	4.1	3.36	0.7	8.16	1.9	10.06
740	1.0325	3.33	4.6	3.96	0.7	9.26	1.64	10.9
741	1.0245	5.33	3.4	3.0	0.52	6.92	1.74	8.66
742	1.0275	4.66	4.1	5.06	0.60	9.76	2.3	12.06
743	1.026	10.0	4.05	4.65	0.6	8.3	2.5	10.8
744	1.0308	8.0	4.7	4.58	0.62	9.9	3.0	12.9
745	1.0308	8.0	4.65	4.57	0.7	9.92	2.7	12.62
746	1.034	7.0	4.85	5.09	0.6	10.54	2.32	12.86
747	1.0265	26.66	4.5	4.1	0.56	9.16	6.42	15.58
748	1.0298	12.0	4.9	3.9	0.66	9.46	3.2	12.66
749	1.0305	5.0	4.95	4.19	0.78	9.92	3.4	13.32
750	1.0322	5.33	5.15	4.01	0.64	9.8	2.5	12.3
751	1.0268	8.0	4.05	3.95	0.5	8.5	2.06	10.56
752	1.0305	9.0	4.55	4.55	0.56	9.66	2.72	12.38
753	1.0298	11.0	4.75	5.15	0.56	10.46	3.0	13.46
754	1.0303	9.0	4.5	4.9	0.68	10.08	2.32	12.4
755	1.0293	6.0	4.3	4.6	0.54	9.44	4.78	14.22
756	1.0315	6.66	4.65	4.31	0.66	9.62	2.08	11.7
757	1.03	12.5	4.45	4.03	0.72	9.2	3.8	13.0
758	1.0313	6.0	4.75	4.05	0.6	9.4	2.1	11.5
759	1.03	4.66	4.4	4.24	0.6	9.24	1.66	10.90
760	1.0255	4.66	3.75	3.41	0.7	7.86	1.44	9.03
761	1.0255	7.33	3.95	3.25	0.54	7.74	2.44	10.18
762	1.0248	8.0	3.65	3.05	0.46	7.16	2.5	9.66
763	1.0295	7.0	4.35	4.11	0.74	9.2	2.1	11.3
764	1.0298	6.0	4.6	3.34	0.62	8.56	2.76	11.32
765	1.03	3.0	4.95	3.37	0.64	8.96	1.54	10.5
766	1.031	8.66	4.65	4.51	0.64	9.8	2.24	12.04
767	1.0298	9.0	4.75	3.71	0.6	9.06	2.5	11.56
768	1.0305	7.0	4.55	4.25	0.58	9.38	2.06	11.44
769	1.0218	5.33	3.2	3.29	0.46	6.9	1.62	8.52
770	1.0285	4.66	4.45	3.95	0.52	8.92	1.8	10.72
771	1.0282	9.33	4.05	4.25	0.66	8.96	2.3	11.26
772	1.0312	6.00	4.7	4.6	0.74	10.04	2.30	12.34
773	1.027	8.0	3.9	3.82	0.74	8.46	2.68	11.14
774	1.032	2.0	4.5	4.5	0.6	9.6	0.8	10.4

ANALYSES.— *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
775	1.028	6.66	4.15	3.85	0.66	8.66	2.5	11.16
776	1.03	12.0	4.8	3.9	0.76	9.46	4.0	13.46
777	1.031	7.0	4.7	3.64	0.76	9.1	2.62	11.72
778	1.0313	6.66	4.85	4.35	0.56	9.76	2.4	12.16
779	1.03	6.66	4.35	3.93	0.70	8.98	2.52	11.5
780	1.0295	6.0	4.2	4.14	0.62	8.96	2.46	11.42
781	1.0258	34.66	4.7	4.72	0.7	10.12	7.8	17.92
782	1.0315	6.0	4.7	3.64	0.7	9.04	1.72	10.76
783	1.0317	5.0	4.9	4.18	0.56	9.64	2.22	11.86
784	1.0313	7.0	4.7	5.3	0.74	10.74	2.26	13.0
785	1.0273	7.0	4.15	3.61	0.6	8.36	2.64	11.0
786	1.0268	7.33	4.2	4.28	0.66	9.14	2.42	11.56
787	1.0285	3.33	4.25	3.67	0.74	8.66	1.9	10.56
788	. . .	. . .	. . .	. . .	0.46	8.32	5.64	13.96
789	. . .	. . .	. . .	. . .	0.72	9.52	5.8	15.32
790	1.0298	6.66	4.45	4.15	0.56	9.16	2.7	11.86
791	1.0275	4.33	4.05	3.65	0.66	8.36	1.2	9.56
792	1.0295	8.33	4.8	2.42	0.44	7.66	4.8	12.46
793	1.0245	10.66	3.7	2.78	0.6	7.08	2.92	10.0
794	1.0305	4.0	4.85	4.05	0.76	9.66	3.34	13.0
795	1.03	8.0	4.7	4.06	0.64	9.4	2.78	12.18
796	1.022	34.0	3.85	3.37	0.5	7.72	6.4	14.12
797	1.0275	9.33	4.85	3.15	0.56	8.56	3.0	11.56
798	1.0308	7.33	5.1	3.46	0.64	9.2	3.6	12.86
799	1.032	10.0	4.75	4.42	0.54	9.66	3.1	12.76
800	1.025	8.9	4.2	3.42	0.6	8.22	3.78	12.0
801	1.0285	10.0	4.4	4.4	0.6	9.4	3.56	12.96
802	1.025	3.33	3.55	3.63	0.46	7.64	1.2	8.84
803	1.0323	0.5	4.75	3.75	0.64	9.14	0.12	9.26
804	1.0305	2.0	4.5	4.3	0.56	9.36	0.8	10.16
805	1.0268	8.0	3.9	3.58	0.6	8.08	2.06	10.14
806	1.026	4.66	3.75	3.85	0,52	8.12	1.84	9.96
807	1.0308	6.0	4.55	4.37	0,54	9.46	1.3	11.26
808	1.0305	4.66	4.6	4.1	0,78	9.48	2.44	11.92
809	1.026	32.0	4.6	3.54	0.46	8.6	7.16	15.76
810	1.029	4.66	4.5	3.62	0.62	8.74	2.14	10.88
811	1.0288	2.0	4.25	3.77	0.38	8.4	1.1	9.50

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk. Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
812	1.0315	4.66	4.7	3.9	0.6	9.2	1.98	11.18
813	1.027	6.66	4.1	3.78	0.44	8.32	1.94	10.26
814	1.026	9.33	4.05	3.83	0.56	8.44	3.3	11.74
815	1.0298	11.33	4.3	5.22	0.7	10.22	5.44	15.66
816	1.028	4.66	4.4	3.86	0.5	8.76	2.98	11.74
817	1.0242	6.66	3.65	3.49	0.6	7.74	2.26	10.0
818	1.032	2.66	5.05	4.39	0.66	10.10	1.0	11.1
819	1.0225	2.0	3.4	2.88	0.6	6.88	1.16	8.04
820	1.029	5.33	4.1	4.54	0.72	9.36	2.2	11.56
821	1.0305	7.0	5.3	4.0	0.62	9.92	4.12	14.04
822	1.0235	4.66	3.4	3.5	0.6	7.5	1.4	8.9
823	1.0285	6.66	4.35	3.97	0.68	9.1	3.0	12.1
824	1.014	3.0	2.05	2.29	0.26	4.6	1.3	5.9
825	1.0273	12.0	4.3	4.22	0.76	9.28	4.0	13.28
826	1.0248	4.66	3.7	2.86	0.74	7.3	2.16	9.46
827	1.026	8.0	4.1	3.5	0.4	8.04	3.02	11.06
828	1.0302	15.0	4.75	4.27	0.78	9.8	4.4	14.2
829	1.0278	5.0	4.415	4.03	0.58	9.02	2.1	11.12
830	1.0275	4.0	4.45	3.73	0.62	8.8	2.26	11.06
831	1.026	5.0	3.7	3.52	0.64	7.86	1.38	9.24
832	1.029	5.0	4.3	3.6	0.66	8.56	1.6	10.16
833	1.021	7.0	3.25	3.11	0.4	6.76	1.6	8.36
834	1.021	3.33	3.25	3.07	0.34	6.66	1.08	7.74
835	1.0268	9.0	4.25	3.67	0.54	8.46	2.3	10.76
836	1.0305	8.66	4.5	4.56	0.68	9.74	2.14	11.88
837	1.025	6.0	3.6	3.04	0.46	8.12	1.2	9.32
838	1.018	8.9	3.2	2.82	0.44	6.46	2.2	8.66
839	1.0268	2.0	3.8	3.6	0.68	8.08	0.68	8.76
840	1.025	13.0	3.4	3.04	0.5	6.94	3.52	10.46
841	1.0283	7.0	4.3	3.3	0.52	8.12	2.6	10.72
842	1.023	6.0	3.35	2.89	0.44	6.68	1.82	8.5
843	1.0323	10.0	5.0	4.2	0.66	9.86	3.6	13.46
844	1.026	10.0	4.4	3.06	0.64	8.1	2.76	10.86
845	1.02	11.0	3.1	2.7	0.4	6.2	3.5	9.7
846	1.022	11.33	2.85	2.75	0.46	6.06	2.9	8.96
847	1.0238	5.33	3.4	2.94	0.4	6.74	2.02	8.76
848	1.031	10.0	4.75	3.95	0.74	9.44	3.3	12.74

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol-	Milk. Sugar.	Albumi-noids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
849	1.0295	6.66	4.6	4.24	0.74	9.58	1.78	11.36
850	1.032	7.5	4.65	3.11	0.74	9.5	3.36	12.86
851	1.03	8.0	4.6	3.66	0.64	8.9	3.2	12.1
852	1.032	10.6	4.9	4.76	0.68	10.34	2.46	12.8
853	1.029	16.6	4.9	2.74	0.66	8.3	6.72	15.02
854	1.026	18.6	4.75	2.79	0.66	8.2	6.26	14.46
855	1.0173	7.33	2.5	2.16	0.38	5.04	1.58	6.62
856	1.0302	8.0	4.65	3.89	0.68	9.22	2.28	11.5
857	1.0283	6.0	4.4	3.16	0.64	8.2	2.12	10.32
858	1.032	12.6	4.75	4.21	0.62	9.58	3.98	13.56
859	1.033	10.0	4.85	4.21	0.7	9.76	3.08	12.84
860	1.031	14.0	4.55	4.29	0.66	9.5	3.64	13.14
861	1.0245	9.0	3.5	3.1	0.6	7.2	2.54	9.74
862	1.0332	8.0	5.0	4.48	0.52	10.1	2.7	12.8
863	1.0298	11.33	4.35	4.09	0.56	9.0	3.06	12.06
864	1.0318	8.66	4.75	4.05	0.66	9.46	3.54	13.0
865	1.0318	10.0	4.95	3.79	0.6	9.34	3.16	12.5
866	1.0325	10.0	4.7	4.56	0.62	9.88	2.58	12.46
867	1.032	10.33	4.9	4.36	0.74	10.0	2.88	12.88
868	1.033	6.66	4.9	4.3	0.56	9.76	1.84	11.6
869	1.033	8.0	5.05	4.39	0.54	9.98	3.04	13.02
870	1.0335	7.0	4.9	4.16	0.7	9.76	2.44	12.2
871	1.0318	8.0	4.8	3.8	0.76	9.36	2.68	12.04
872	1.0333	23.33	4.8	5.34	0.66	10.8	3.3	14.1
873	1.028	11.0	4.2	3.58	0.64	8.42	2.86	11.28
874	1.0295	13.33	4.75	4.02	0.62	9.39	3.78	13.18
875	1.03	6.0	4.6	3.74	0.52	8.86	2.5	11.36
876	1.024	4.66	3.45	2.81	0.6	6.86	1.82	8.68
877	1.028	10.0	4.6	3.86	0.62	9.06	2.82	11.88
878	1.033	12.66	5.35	4.91	0.7	10.96	3.66	14.62
879	1.0325	10.66	4.7	5.78	0.66	9.84	3.12	12.96
880	1.031	12.66	4.4	5.04	0.6	10.44	3.14	13.18
881	1.028	10.66	4.1	3.9	0.6	8.6	3.0	11.6
882	1.031	2.0	4.8	4.92	0.64	9.64	3.36	13.0
883	1.03	11.33	4.85	3.49	0.56	8.9	0.94	9.84
884	1.0298	6.0	4.95	4.83	0.6	9.38	2.82	12.2
885	1.0275	10.66	3.9	2.6	0.6	8.1	2.14	10.24

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk. Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
886	1.0313	9.33	4.65	5.41	0.6	9.66	2.66	12.32
887	1.0315	9.33	4.9	4.1	0.66	9.66	3.32	12.98
888	1.0328	8.66	4.8	5.0	0.6	10.4	2.84	13.24
889	1.0325	10.0	4.55	5.11	0.8	10.46	2.3	12.76
890	1.029	8.66	4.35	3.95	0.68	8.98	3.36	12.34
891	1.025	6.0	3.35	3.71	0.64	7.9	2.1	10.0
892	1.0308	13.33	4.7	4.5	0.6	9.8	3.0	12.88
893	1.028	8.0	4.05	4.03	0.68	8.76	2.68	11.44
894	1.032	5.33	4.75	4.21	0.68	9.64	1.66	11.3
895	1.023	6.66	3.2	3.2	0.4	6.8	2.16	8.96
896	1.031	9.0	4.45	4.25	0.62	9.32	2.56	11.88
397	1.032	7.33	4.75	4.07	0.72	10.54	2.94	13.48
898	1.030	3.33	4.75	4.11	0.74	9.6	0.66	10.26
899	1.029	18.0	4.55	3.55	0.66	8.76	5.0	13.76
900	1.0308	8.33	4.5	4.04	0.64	9.18	3.36	12.54
901	1.0308	7.0	4.85	3.89	0.6	9.34	4.3	13.64
902	1.0255	2.66	3.45	3.03	0.5	7.08	1.06	8.14
903	1.0235	2.0	2.15	3.85	0.56	6.56	0.84	7.4
904	1.0245	6.0	3.6	3.0	0.44	7.04	1.9	8.94
905	1.026	9.0	3.7	3.56	0.44	7.7	2.12	9.82
906	1.0312	5.33	4.45	3.81	0.66	8.92	2.1	11.02
907	1.0318	10.0	4.3	4.68	0.66	9.34	3.4	12.74
908	1.0326	3.33	5.2	3.52	0.62	9.34	2.76	12.1
909	1.0328	9.33	4.75	3.91	0.66	9.32	2.9	12.22
910	1.033	3.0	3.65	5.01	0.78	9.44	1.56	11.0
911	1.0268	4.66	3.65	3.35	0.64	7.64	1.36	9.0
912	1.0302	5.3	4.2	3.64	0.6	8.44	1.76	10.2
913	1.0318	12.0	4.85	4.41	0.66	9.92	3.4	13.32
914	1.029	6.33	4.25	3.45	0.56	8.26	2.5	10.76
915	1.0318	6.0	4.8	4.1	0.6	9.5	2.72	12.22
916	1.0312	7.0	4.65	4.27	0.62	9.54	2.6	12.14
917	1.032	8.0	4.85	4.11	0.74	9.7	3.9	13.6
918	1.031	10.0	4.9	3.76	0.58	9.24	2.54	11.78
919	1.0318	10.0	4.5	4.3	0.62	9.42	1.88	11.3
920	1.032	10.0	4.95	3.99	0.64	9.58	4.1	13.68
921	1.031	10.5	4.6	4.94	0.64	9.18	3.12	12.3
2	1.023	11.0	3.35	2.95	0.4	6.68	2.6	9.28

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
923	1.0315	8.0	4.85	3.99	0.76	9.6	2.72	12.32
924	1.033	11.0	4.95	4.48	0.64	10.08	2.4	12.48
925	1.033	13.0	4.9	4.7	0.64	10.14	3.92	14.06
926	1.028	6.66	4.25	3.51	0.66	8.42	2.6	11.02
†927	1.026	4.0	3.5	3.4	0.62	7.52	11.4	8.66
928	1.025	11.33	4.15	2.49	0.62	7.26	3.56	10.82
929	1.0305	6.66	4.45	3.55	0.7	8.7	2.54	11.24
930	1.0302	6.0	4.5	3.8	0.74	9.04	2.56	11.6
931	1.0325	8.0	4.95	4.05	0.72	9.72	2.44	12.16
932	1.0335	13 0	4.75	4.35	0.8	9.9	4.1	14.0
933	1.032	6.0	4.7	4.0	0.62	9.32	1.8	11.12
934	1.0265	7.0	4.15	3.65	0.52	8.32	1.74	10.06
935	1.0288	8.0	4.45	3.35	0.54	8.34	2.6	10.94
936	1.030	7.0	4.8	3.36	0.64	8.80	3.1	11.9
937	1.03	9.33	4.3	4.26	0.64	9.2	2.64	11.84
938	1.0282	10.0	4.2	3.7	0.6	8.5	3.1	11.6
939	1.023	4.0	3.25	3.25	0.56	7.06	1.3	8.36
940	1.031	8.0	4.45	3.91	0.72	9.08	2.46	11.54
941	1.0322	10.33	4.95	4.51	0.7	10.16	2.66	12.82
942	1.032	15.0	4.6	4.38	0.78	9.76	3.74	13.5
943	1.032	8.0	5.05	3.91	0.74	9.7	3.52	13.22
944	1.0348	3.33	4.9	4.58	0.72	10.2	1.52	11.72
945	1.0325	7.0	4.25	4.65	0.6	9.5	2.1	11.6
946	1.0305	12.0	4.35	4.45	0.6	9.4	3.24	12.64
947	1.0325	7.0	5.1	4.0	0.7	9.8	3.12	12.92
948	1.027	8.0	3.5	4.1	0.68	8.28	2.66	10.94
949	1.0302	14.0	4.3	4.82	0.88	9.0	4.64	13.64
950	1.027	4.66	4.4	4.62	0.58	9.6	2.92	12.52
951	1.031	10.0	4.35	4.87	0.6	9.82	2.44	12.26
952	1.031	9.0	4.25	4.97	0.6	9.82	2.38	12.2
953	1.033	10.0	4.85	5.35	9.8	10.1	3.54	13.64
954	1.0335	6.0	4.85	4.71	0.64	10.2	1.74	11.94
955	1.021	95.0	4.55	4.05	0.42	9.02	6.48	15.5
956	1.034	4.66	5.1	4.6	0.8	10.5	1.64	12.14
957	1.031	4.0	4.8	4.5	0.66	9.96	3.44	13.4
958	1.0318	4.66	5.15	4.21	0.6	9.96	3.04	13.0
959	1.0228	4.0	3.2	2.8	0.56	6.65	1.76	8.32

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
960	1.023	8.0	3.65	2.66	0.6	6.86	2.4	9.26
961	1.031	6.0	4.75	3.85	0.68	9.28	2.8	12.08
962	1.0338	2.5	4.8	3.88	0.7	9.38	1.3	10.68
963	1.03	6.0	4.75	3.39	0.76	8.9	3.7	12.6
964	1.0298	2.5	4.2	3.36	0.68	8.24	1.14	9.38
965	1.0305	7.0	4.85	3.79	0.66	9.3	3.4	12.44
966	1.0263	10.33	3.9	3.56	0.6	8.06	2.28	10.34
967	1.0285	7.0	4.45	3.69	0.6	8.74	2.96	11.7
968	1.0288	6.0	4.15	3.17	0.7	8.02	2.7	10.72
969	1.03	4.66	4.3	4.02	0.7	9.02	3.1	12.12
970	1.0298	6.0	4.25	3.75	0.8	8.8	2.1	11.9
971	1.028	18.0	4.05	3.76	0.54	8.3	4.5	12.8
972	1.0305	8.66	4.75	3.43	0.92	9.1	3.66	12.76
973	1.0335	3.33	4.9	3.6	0.7	9.2	1.84	11.04
974	1.03	13.33	4.6	4.04	0.66	9.3	3.84	13.14
975	1.033	3.33	5.05	4.23	0.66	9.94	3.04	12.98
976	1.0375	5.33	4.5	4.56	0.5	9.56	2.94	12.5
977	1.031	8.0	4.05	4.51	0.84	9.4	2.86	12.26
978	1.03	8.66	4.6	3.74	0.84	9.28	3.4	12.68
979	1.032	7.33	4.7	4.56	0.7	9.96	3.12	13.08
980	1.032	7.33	4.85	3.83	0.76	9.44	2.8	12.24
981	1.029	7.0	4.25	3.92	0.52	8.7	3.28	11.98
982	1.0295	1.66	4.3	3.62	0.5	8.46	1.36	9.78
983	1.0278	. . .	3.8	3.42	0.46	7.68	0.68	8.36
984	1.0375	10.0	4.65	4.17	0.6	9.42	3.24	12.66
985	1.03	4.66	4.4	3.96	0.68	9.04	1.32	10.36
986	1.0325	13.3	4.5	4.2	0.6	9.3	1.22	10.52
987	1.03	6.66	4.6	3.36	0.74	8.7	3.36	12.06
988	1.0295	12.0	4.6	3.64	0.7	8.94	4.36	13.3
989	1.0262	6.66	3.8	3.62	0.56	7.98	3.64	11.62
990	1.031	6.66	4.6	4.28	0.74	9.62	2.96	12.58
991	1.0315	4.0	4.8	3.62	0.66	9.08	1.48	10.56
992	1.016	. . .	4.5	3.08	0.54	8.12	18.72	26.84
993	1.028	6.0	4.25	3.61	0.64	8.5	2.8	11.3
994	1.0315	6.66	4.7	3.98	0.66	9.34	2.54	11.88
995	1.031	5.33	4.65	4.27	0.7	9.62	2.64	12.26
996	1.0275	12.0	4.1	3.52	0.6	2.28	3.92	12.41

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Cascine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
997	1.0313	2.0	4.7	4.24	0.76	9.7	2.78	12.48
998	1.0278	4.66	3.9	3.46	0.64	8.0	2.42	10.42
999	1.029	10.66	4.7	3.4	0.7	8.8	3.46	12.26
1000	1.0278	3.33	4.0	3.24	0.7	7.94	1.68	9.62
1001	1.032	8.0	4.3	2.38	0.76	7.44	5.56	13.0
1002	1.0322	12.0	4.95	2.07	0.62	7.64	4.78	12.42
1003	1.025	9.3	3.55	3.71	0.54	7.8	3.24	11.04
1004	1.019	. . .	3.1	2.34	0.72	6.16	2.9	9.06
1005	1.019	9.0	3.0	2.24	0.4	5.64	3.3	8.94
1006	1.03	10.0	4.55	3.59	0.7	8.84	3.4	12.24
1007	1.0295	9.33	4.35	3.71	0.66	8.72	2.94	11.66
1008	1.027	13.33	4.5	3.22	0.8	8.52	4.18	13.7
1009	1.0315	5.33	5.05	3.53	0.8	9.36	3.8	13.16
1010	1.0343	4.0	4.75	4.49	0.6	9.84	1.86	11.7
1011	1.0308	10.0	4.75	3.73	0.74	9.22	3.74	12.96
1012	1.03	8.66	4.7	3.86	0.74	9.3	3.2	12.5
1013	1.0278	6.0	4.0	3.22	0.64	7.86	2.54	10.4
1014	1.033	5.33	4.75	3.87	0.6	9.22	2.3	11.52
1015	1.0312	5.0	4.6	3.56	0.64	8.8	2.48	11.28
1016	1.033	10.0	4.8	4.2	0.76	9.76	3.5	13.36
1017	1.0315	8.0	4.8	3.42	0.6	8.82	3.5	12.22
1018	1.031	10.0	4.75	4.09	0.76	9.6	2.9	12.5
1019	1.0305	10.66	4.7	4.1	0.7	9.5	3.5	13.0
1020	1.032	6.0	4.75	3.89	0.76	9.4	2.56	11.96
1021	1.027	7.33	4.0	3.24	0.7	7.94	2.7	10.64
1022	1.0218	8.0	3.55	3.59	0.66	7.8	2.62	10.42
1023	1.03	11.33	4.5	3.9	0.64	9.04	3.36	12.4
1024	1.028	20.0	4.7	4.0	0.66	9.36	5.58	14.94
1025	1.0245	8.66	3.6	3.16	0.56	7.32	2.4	9.72
1026	1.0292	8.0	4.55	3.59	0.56	8.7	2.44	11.14
1027	1.0265	10.0	4.05	3.63	0.58	8.26	3.24	11.5
1028	1.0288	3.33	4.2	3.64	0.62	8.46	2.06	10.52
1029	1.026	10.33	4.5	3.27	0.64	8.06	3.38	11.44
1030	1.0248	8.0	3.9	3.04	0.64	7.54	3.38	10.92
†1031	1.0185	. . .	4.1	2.94	0.7	7.74	17.4	25.14
1032	1.031	5.0	4.3	4.06	0.64	9.0	1.8	10.8
1033	1.0325	10.66	4.75	4.07	0.6	9.42	3.5	12.92

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
1034	1.0302	8.3	4.65	3.17	0.56	8.38	2.88	11.26
1035	1.0315	10.0	4.85	3.31	0.74	9.0	2.66	11.66
1036	1.032	5.33	4.6	3.64	0.76	9.0	2.12	11.12
1037	1.032	6.0	4.6	3.58	0.64	8.82	2.46	11.28
1038	1.031	7.33	4.75	3.85	0.74	9.34	3.82	13.16
1039	1.031	6.66	4.25	4.27	0.6	9.12	2.7	11.82
1040	1.0256	16.66	4.05	3.15	0.64	7.84	4.22	12.06
1041	1.0323	8.0	4.75	3.89	0.7	9.34	3.02	12.36
1042	1.0305	5.0	4.35	4.01	0.6	8.96	2.7	11.66
1043	1.028	7.33	4.4	3.44	0.66	8.5	3.02	11.52
1044	1.032	7.33	4.85	4.27	0.56	9.68	2.52	12.2
1045	1.0323	6.0	4.7	3.74	0.76	9.2	2.56	11.76
1046	1.031	10.0	4.5	3.86	0.56	8.92	3.2	12.12
1047	1.033	5.66	4.8	4.1	0.76	9.06	2.64	12.3
1048	1.028	6.66	3.9	3.4	0.76	8.06	1.9	9.96
1049	1.0283	6.3	4.0	3.5	0.64	8.14	2.04	10.18
1050	1.031	6.66	4.55	3.65	0.8	9.0	3.0	12.0
1051	1.0305	6.66	4.5	3.82	0.78	9.1	2.88	11.98
1052	1.031	8.0	4.55	2.47	0.72	7.74	3.8	11.54
1053	1.013	10.0	4.65	3.65	0.50	8.8	3.26	12.06
1054	1.032	11.33	5.00	4.10	0.64	9.74	3.22	12.96
1055	1.03	12.0	4.95	3.39	0.66	9.0	3.5	12.5
1056	1.0318	13.33	4.65	4.26	0.56	9.46	3.16	12.62
1057	1.033	5.0	4.6	3.24	0.74	9.58	2.32	11.9
1058	1.031	2.0	4.3	4.24	0.76	9.3	0.26	9.56
1059	1.03	12.66	4.55	4.83	0.76	9.14	4.0	13.14
1060	1.034	3.33	5.05	3.53	0.68	9.26	0.88	10.14
1061	1.0285	11.33	4.15	3.51	0.7	8.36	2.94	11.3
1062	1.032	7.33	4.4	3.76	0.7	8.86	2.65	11.5
1063	1.032	11.33	4.8 5	3.65	0.92	9.42	3.18	12.60
1064	1.0318	10.3	4.85	3.61	0.64	9.2	3.14	13.62
1065	1.0328	13.33	4.8	4.2	0.7	9.7	3.68	13.38
1066	1.0328	13.6	4.8	4.14	0.7	9.64	3.86	13.5
1067	1.0318	13.33	4.85	4.01	0.68	9.54	4.32	13.86
1068	1.03	6.66	4.25	3.59	0.5	8.34	2.56	10.9
1069	1.0298	4.0	4.3	3.46	0.64	8.4	3.1	11.5
1070	1.032	8.0	4.6	3.98	0.78	9.36	2.7	12.06

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
1071	1.0278	5.33	3.8	5.3	0.6	9.7	0.3	10.0
1072	1.026	8.66	3.75	3.35	0.7	7.8	2.04	9.84
1073	1.032	4.66	4.65	4.21	0.64	9.5	2.12	11.62
1074	1.028	4.33	4.0	3.4	0.56	7.96	1.98	9.94
1075	1.031	10.0	4.65	3.79	0.7	9.14	3.06	12.2
1076	1.0283	28.0	4.7	3.7	0.8	9.2	7.14	16.34
1077	1.032	8.33	4.85	3.85	0.72	4.42	2.88	12.30
1078	1.0336	4.0	4.85	3.51	0.74	9.1	1.74	10.84
1079	1.0295	6.0	4.35	3.25	0.74	8.44	2.44	10.88
1080	1.027	4.33	3.85	3.61	0.54	8.0	2.64	10.64
1081	1.027	5.0	3.7	3.12	0.64	7.46	1.76	9.22
1082	1.0312	6.66	4.5	3.76	0.64	8.9	2.54	11.44
1083	1.0308	14.0	4.75	3.85	0.66	9.26	4.8	14.06
1084	1.0325	6.0	4.85	3.59	0.7	9.14	3.12	12.26
1085	1.0258	9.33	3.65	3.11	0.56	7.32	2.44	9.76
1086	1.033	10.0	5.0	4.04	0.6	9.64	2.76	12.4
1087	1.0318	8.0	4.85	3.59	0.74	9.28	3.36	12.64
1088	1.0288	8.0	3.85	3.47	0.68	8.0	2.64	10.64
1089	1.0295	10.0	4.05	3.85	0.56	8.46	3.0	11.46
1090	1.0318	9.33	4.5	3.94	0.7	9.14	0.82	9.96
1091	1.0318	11.33	4.65	4.35	0.66	9.66	3.8	13.46
1092	1.0325	7.33	4.65	3.95	0.7	9.3	0.46	9.76
1093	1.0303	12.66	4.5	3.8	0.6	8.9	3.8	12.7
1094	1.0305	8.66	4.9	3.32	0.72	8.94	3.7	12.64
1095	1.0298	6.66	4.65	3.65	0.6	8.9	3.06	11.96
1096	1.032	10.0	4.7	3.98	0.56	9.24	3.8	13.04
1097	1.033	7.33	4.8	4.34	0.6	9.74	1.86	11.6
1098	1.0328	10.0	5.0	3.6	0.68	9.28	3.2	12.44
1099	1.0298	6.0	4.4	3.96	0.44	8.8	2.06	10.86
1100	1.0285	7.33	4.15	3.29	0.52	7.96	4.48	12.44
1101	1.0318	8.0	4.75	3.69	0.66	9.1	2.6	11.7
1102	1.03	7.0	4.45	3.79	0.66	8.9	2.1	11.0
1103	1.0313	8.0	4.75	4.07	0.58	9.4	2.9	12.3
1104	1.0298	8.0	4.5	4.1	0.5	9.2	2.54	11.74
1105	1.0318	10.0	4.7	4.04	0.66	9.4	3.0	12.4
1106	1.031	6.66	4.05	4.35	0.54	8.94	3.04	11.98
1107	1.0275	6.66	3.9	3.12	0.56	7.58	2.3	9.88

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
1108	1.026	2.66	3.65	3.91	0.54	7.1	1.9	9.0
1109	1.0315	7.33	4.7	4.82	0.7	9.22	3.08	12.3
1110	1.031	4.0	4.25	3.61	0.7	8.56	1.82	10.38
1111	1.03	9.66	4.35	3.49	0.52	8.36	2.4	10.76
1112	1.031	5.0	4.6	3.46	0.7	8.76	2.24	11.0
1113	1.0328	6.0	4.5	4.4	0.56	9.46	2.24	11.7
1114	1.0325	5.0	4.05	4.43	0.56	9.04	1.6	10.64
1115	1.0318	4.33	4.06	3.72	0.56	8.88	1.56	10.44
1116	1.032	5.33	5.05	3.59	0.6	9.24	3.92	13.16
1117	1.0228	5.0	3.05	1.79	0.56	6.4	2.06	8.46
1118	1.03	6.0	4.25	3.67	0.62	8.64	2.0	10.64
1119	1.0283	5.0	3.9	3.78	0.46	8.14	1.46	9.6
1120	1.033	7.0	4.95	3.83	0.68	9.46	3.0	12.46
1121	1.0338	3.33	5.0	4.2	0.54	9.74	2.06	11.8
1122	1.0318	6.33	4.7	4.06	0.66	9.42	2.28	11.7
1123	1.031	2.66	4.5	3.92	0.54	8.96	2.18	11.14
1124	1.034	4.0	4.35	4.45	0.66	9.96	0.88	10.84
1125	1.0265	5.0	3.65	3.47	0.42	7.54	1.8	9.34
1126	1.0305	11.33	4.55	4.69	0.6	9.84	4.52	14.36
1127	1.025	4.0	3.6	3.12	0.48	7.2	1.84	9.04
1128	1.0295	14.66	4.95	4.31	0.58	9.84	5.74	15.58
1129	1.032	7.33	4.9	4.02	0.62	9.54	2.8	12.34
1130	1.033	6.66	5.0	4.08	0.62	9.7	3.16	12.86
1131	1.033	6.66	5.05	4.01	0.74	9.8	2.94	12.74
1132	1.0335	3.33	5.0	4.04	0.56	9.6	1.28	10.88
1133	1.0318	9.33	4.75	4.51	0.58	9.44	2.84	12.28
1134	1.0295	5.33	4.25	3.59	0.56	8.4	2.26	10.66
1135	1.029	6.0	4.15	3.61	0.44	8.2	2.44	10.64
1136	1.033	5.33	4.6	4.28	0.54	9.42	1.92	11.34
1137	1.032	5.33	4.55	4.03	0.58	9.16	3.04	12.2
1138	1.0275	6.33	3.95	3.49	0.52	7.96	2.5	10.46
1139	1.033	3.0	4.75	4.49	0.56	9.8	2.1	11.9
1140	1.029	12.0	3.65	4.65	0.7	9.0	4.34	13.34
1141	1.0313	10.0	4.45	3.97	0.52	8.94	2.66	11.6
1142	1.03	6.3	3.95	3.95	0.48	8.38	2.46	10.84
1143	1.029	9.66	4.0	3.76	0.56	8.32	2.64	10.96
1144	1.031	6.0	4.35	3.79	0.6	8.74	1.6	10.34

ANALYSES. — *Continued.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albuminoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
1145	1.0315	11.33	4.15	4.51	0.76	9.42	2.98	12.4
1146	1.03	8.0	4.25	3.71	0.64	8.6	2.88	11.48
1147	1.0318	9.0	4.65	4.23	0.6	9.48	3.82	13.3
1148	1.0286	9.33	4.4	4.06	0.5	8.96	3.38	12.34
1149	1.0314	9.0	4.65	4.41	0.74	9.8	3.24	13.04
1150	1.0296	6.66	4.5	4.08	0.7	9.28	2.62	11.9
1151	1.0296	4.0	4.3	3.46	0.64	8.4	1.54	9.94
1152	1.0293	10.0	4.35	3.77	0.4	8.52	3.02	11.54
1153	1.034	6.66	4.8	4.40	0.46	9.66	2.52	12.18
1154	1.0305	6.66	4.4	3.98	0.6	8.98	2.3	11.28
1155	1.0325	10.0	4.8	4.06	0.66	9.52	2.9	12.42
1156	1.0264	5.0	3.7	3.6	0.56	7.86	3.3	11.16
1157	1.0336	5.33	4.85	4.25	0.8	9.8	2.5	12.3
1158	1.033	8.0	4.9	4.1	0.62	9.62	2.96	12.58
1159	1.0273	10.0	4.0	3.56	0.52	8.08	4.34	12.42
1160	1.0318	8.0	4.5	4.44	0.7	9.64	3.3	12.94
1161	1.031	6.0	4.35	3.99	0.74	9.08	2.56	11.64
1162	1.0296	5.0	4.25	3.69	0.8	8.74	2.64	11.38
1163	1.034	5.33	4.6	3.62	0.88	9.1	3.16	12.26
1164	1.0295	6.66	4.15	4.23	0.8	9.18	2.16	11.34
1165	1.0334	13.33	4.35	5.11	0.6	10.06	3.4	13.46
1166	1.0324	10.0	4.6	4.56	0.82	9.98	3.38	13.36
1167	1.0291	3.33	4.1	3.44	0.54	8.08	1.36	9.44
1168	1.032	6.0	4.6	3.64	0.64	8.88	2.9	11.78
1169	1.0275	7.33	4.25	3.07	0.68	8.0	2.88	10.88
1170	1.0315	3.33	4.75	3.93	0.58	9.26	2.24	11.5
1171	1.026	8.66	3.75	2.95	0.56	7.26	3.04	10.3
1172	1.0265	10.0	4.65	2.75	0.6	8.0	2.62	11.62
1173	1.03	8.0	4.2	3.78	0.54	8.52	3.1	11.62
1174	1.0355	2.0	4.9	4.66	0.44	10.0	0.36	10.36
1175	1.03	4.0	4.4	3.4	0.6	8.4	1.88	10.28
1176	1.030	6.0	4.25	4.05	0.54	8.84	3.1	11.94
1177	1.0325	10.0	5.0	4.14	0.66	9.8	4.0	13.8
1178	1.0323	6.0	4.65	3.99	0.66	9.3	2.46	11.76
1179	1.02	5.0	2.75	2.73	0.36	5.84	2.66	8.5
1180	1.0313	2.0	4.7	3.68	0.5	8.88	2.54	11.42
1181	1.0334	7.0	5.0	3.86	0.7	9.56	3.72	13.28
182	1.0283	2.0	4.25	2.67	0.66	7.56	1.5	9.08

ANALYSES. — *Concluded.*

No.	Specific gravity at 60° F.	Cream % by vol.	Milk-Sugar.	Albumnoids (Caseine, etc.)	Ash.	Solids, not fat.	Fat.	Total Solids.
1183	1.0321	4.0	4.55	3.85	0.64	9.04	2.68	11.72
1184	1.03	24.0	5.1	3.82	0.66	9.58	8.46	18.04
1185	1.028	4.0	4.1	3.46	0.58	8.14	2.22	10.36
*1186	1.0322	12.0	4.65	4.69	0.64	9.98	3.84	13.82
*1187	1.0345	12.0	5.0	4.74	0.66	10.4	6.02	16.42
1188	1.0345	11.33	4.9	4.92	0.64	10.46	5.96	16.42
1189	1.0313	8.33	5.0	3.54	0.64	9.18	3.06	12.24
†1190	. . .	. . .	. . .	. . .	0.35	5.1	48.8	53.9
1191	1.031	. . .	4.5	5.12	0.56	10.18	2.98	13.16
1192	1.027	. . .	3.6	3.82	0.54	7.96	1.60	9.56
*1193	1.034	10.0	5.01	4.39	0.72	10.12	3.96	14.08
*1194	1.0355	14.66	4.8	5.42	0.72	10.94	5.64	16.58
1195	1.027	4.66	3.8	3.66	0.48	7.94	2.52	10.46
1196	1.0285	8.0	4.15	3.89	0.54	8.58	2.2	10.78
1197	1.034	7.33	4.75	4.65	0.64	10.04	3.0	13.04
1198	1.0324	9.33	4.7	3.88	0.6	9.18	4.22	13.4
1199	1.0334	11.33	4.9	4.26	0.68	9.84	4.0	13.84
1200	1.0275	16.0	4.2	3.7	0.52	8.42	3.48	11.9
1201	1.0334	8.66	4.8	4.22	0.66	9.68	3.22	12.90
1202	1.0323	6.66	5.1	3.26	0.58	8.94	3.1	12.04
*1203	1.0423	1.0	4.85	7.17	1.04	13.06	4.54	17.6

Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13,— all this series of milk, are of known purity and were taken in the evening at the time of milking; they give an average of sp. gr. 1.0316; cream, 7.86%; sugar, 3.99%; alb., 4.41%; ash, 0.69%; solids not fat, 9.23%; fat, 3.85%; and total solids, 13.03%. All were of a slight acid reaction when tested two hours after the milking. It was June 9, and the cows had been turned to pasture but a short time before.

No. 4. Jersey, 6 years old, 6 months after calving.
5. Mixed Jersey, 2 years old, 2 " " "
6. Mixed Jersey, 5 years old, 9 " " "
7. " " 7 " 7 " " "
8. Hereford, 12 " 2 " " "
9. Mongrel, 3 " 8 " " "
10. Hereford, 10 " 4 " " "
11. Jersey, 10 " 3 " " "

First part of the milking.

12. Jersey, 10 years old, 3 months after calving, middle part of the milking.
13. Jersey, 10 years old, 3 months after calving, strippings.
283 and 284. Gifts from the producer.
285, 286, 287, and 288. Gifts from the producer.
486. Mixed milk from a dairy of 31 cows, mostly grade Ayrshire, but some are of other breeds, morning's milk.
551. Milk of known purity.
678 Milk from grade Ayrshire cow.
1186. Mixed evening milk from 18 native cows. Feed, 10 qts. shorts, 1 qt. corn-meal, 1 qt. cotton-seed meal, with all the English hay they wanted, and some oat hay.
1187. A Jersey cow, one of the above 18.
1193. Morning's milk from a common cow, supposed to be Ayrshire; yield, 11 qts. daily. Feed, 4 qts. ground oats, 4 qts. corn-meal, with all the hay she wants.
1194. Jersey milk. Feed same as 1193.
1203. This cow, 7 years old, to have calved in April, aborted early in February, appeared well when milked on February 28. Average yield 6 to 7 qts. The sample was of a neutral reaction when tested the day after the milking.

CREAM ANALYSES, 1884–85.

Nos. Milk Analyses.[1]	Sp. Gr.	Fat, %	Total Solids.	Cost per Can.
350		39.4	51.74	Traces of Boracic acid.
447	1.022	11.78	20.70	$1 10
470	1.0215	18.1	29.92	1 10
472	1.029	5.6	14.46	80
474	1.029	5.0	14.8	80
1190		48.8	53.9	Traces of Boracic acid.
	1.0283	8.92	17.22	$1 25
	1.0238	11.74	19.5	1 25
	1.0233	12.1	20.1	1 25
	1.026	10.12	18.56	1 25
	1.0275	9.38	18.26	1 25
	1.023	10.1	18.06	1 25
	0.9938	24.4	32.55	1 50

[1] See also Milk Analyses Nos. 362, 408, 633, 645, 717, 927, and 1031.

BUTTER ANALYSES, 1884–85.

[1] These samples were of known purity.
[2] Known to be Butterine.
[3] Known to be Oleomargarine.
[4] Ash consisted of 97.96% Na cl.

No.	Insoluble acids.	Soluble acids.	K O H required.	Fat.	Water.	Curds.	Salts.	Price per pound.
1[1]	87.34	4.09		82.52	11.86	1.52	3.97	
2[2]	95.06			82.96	11.83	2.74	2.47	0.18
3.	83.83							0.35
4[1]	87.65	5.54						
5[3]	92.39	2.73	208.8					
6[1]	88.65			83.2	10.99	2.81	3.0	0.33
7.	83.15							
8.	89.11		211.4					0.40
9.	89.79		208.6					0.40
10.	89.57		213.3					0.40
11.	88.97		215.3					0.40
12.	89.71		203.9					0.40
13.	89.54		199.0					0.40
14.	86.31		241.3					0.32
15.	86.51		229.5					0.32
16.	88.13		218.1					0.40
17.	87.92		217.5					0.40
18.	89.12		211.7					0.40
19.	89.76		211.7					0.40
20.	88.7							0.40
21.	89.1		201.9					0.40
22.	86.95		207.4					0.40
23.	87.89		201.9					0.40
24.	89 7		211.3					0.40
25.	87.5		204.9					0.40
26.	87.03		218.7					0.40
27.	95.13		183.7					0.40
28.	90.1		187.9					0.40
29[4]				70.93	18.67	4.1	6.3	0.40
30.	87.9		212.4					0.42
31[1]	87.13		220.9					
32[1]	85.55		217.4					
33[1]	85.45		215.2					
34[1]	83.67		218.2					

BUTTER ANALYSES. — *Continued.*

No.	Insoluble acids.	Soluble acids.	K O H required.	Fat.	Water.	Curds.	Salts.	Price per pound.
35.	84.56		217.2	85.38	8.04	3.86	2.72	
36.	82.98		216.4	86.52	8.14	1.79	3.55	
37[1]	86.7	4.45						
38[1]	86.91	5.002						
39[1]	88.07							
40[1]	87.5	4.24						
41[1]	86.61	4.2						
42[1]	88.17							

I wish here to acknowledge and to return thanks for the faithful and diligent service of my laboratory assistants, J. O. Jordan, Henry Ehrlich, C. H. Preston, and of George Barnstead, the collector of samples.

Respectfully submitted,

BENNETT F. DAVENPORT, M.D.,

Inspector.

TWENTY-SEVENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK AND VINEGAR,

FROM

April 6, 1885, to December 31, 1885.



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1886.

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CITY OF BOSTON.

TWENTY-SEVENTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK AND VINEGAR.

FROM APRIL 6, 1885, TO DEC. 31, 1885.

Office of the Inspector of Milk and Vinegar,
1151 Washington Street.

To His Honor the Mayor and the Board of Aldermen of the City of Boston: —

Gentlemen, — Massachusetts has the credit of being the first State in the Union to establish an office of which the sole duty was to protect her citizens from the dangers and fraud arising from the sale of adulterated milk. By an act of the General Court, in 1859, it was provided that the Mayor and Aldermen of cities shall appoint an Inspector of Milk; and in pursuance of this duty Hon. Frederic W. Lincoln, Jr., then Mayor of Boston, appointed Mr. Henry Faxon, who was sworn into office on August 10 of that year.

In a journal kept by him, and still carefully preserved at this office, he records, as one of his first entries, the purchase of a "lactometer or milk-prover, and glasses for detecting adulterated milk," and a few days later he writes: "By order of the Mayor, caused one thousand handbills to be printed and distributed throughout the city by the police." Nothing could furnish a greater contrast to the present methods and duties of the office than these two entries in the journal of the first Milk Inspector. There are now in Boston three times as many dealers in milk as the number of handbills

once considered sufficient for distribution "throughout the city;" while the *lactometer* of earlier days has given place to a large and well-appointed laboratory (belonging to the city), furnished with all the best modern scientific appliances for the *chemical analysis* not only of milk, but of such other food products as subsequent legislation has placed under the supervision of the office.

Great progress, too, has been made in the so-called milk laws. Attorneys at the present time hesitate to defend a "milk-case;" and in contrast to this I again copy from the journal of Mr. Faxon, where, under date of Feb. 4, 1861, he writes: —

> This A.M. visited Mr. Healy, City Solicitor, for his opinion in regard to the better enforcement of the milk law. Result: that he considered it worthless and inoperative; and had entirely failed to meet the ability of any person to properly enforce it.

In the report of the Milk Inspector for 1864 he says: —

> Out of many cases which have been brought before the courts of inferior jurisdiction, where convictions were promptly obtained, but one or two have stood the test of a final hearing before the Supreme Court.

All this has been changed. Laws, which at first were found to be defective, have been revised; more recent decisions of the Supreme Court have greatly strengthened the hands of those called upon to enforce the sale of pure milk; and to-day the Massachusetts law has come to be regarded as one of the most stringent of the public statutes, and has served as a model which has been copied in framing similar legislation in many other States. Massachusetts, the first to adopt a standard for pure milk, has been followed in this respect by New Hampshire, Rhode Island, New York, and New Jersey.

Hon. Frederic O. Prince, in his inaugural address to the City Council in 1880, said of this department: —

> If the interests of the citizens require the inspection of milk, the inspection, to be valuable, should be thorough. It is impossible for one inspector to supervise all the dealers throughout the city. He should be assisted. The department, as the Inspector suggests, should be reorganized.

Hon. Martin Griffin, Inspector of Milk in 1880, in his annual report for that year says: —

> The importance of a pure, rich milk to residents of a crowded city is admitted by all, and efforts to secure that end cannot be too strongly urged or commended. . . . The restraining power of the

office is influential, and has resulted in great good to the public; but the office has not reached out to its fulness, and is not up to the requirements of the interests committed to it. The city has grown in territory and population, but the office has remained, with a single exception, the same as when established in 1859. It is apparent that, with such interests to guard and labor to perform, increased facilities for discharging it should be afforded. The duties of the office are exacting and trying; the hours of labor unusual and uncertain, and the territory to cover, wide and distant. . . . If the full intent of the office is to be carried out, and the work faithfully and thoroughly performed, increased assistance should be afforded, and the office placed in the position which its work and importance demand.

Notwithstanding these and other similar suggestions and requests, often repeated, it was only at the beginning of the present official year that the office was, for the first time in its history, provided with the means in any degree adequate to its requirements or to develop its possibilities. With the increased facilities thus furnished, the department has been completely reorganized. What has been accomplished, together with such other matter in relation to the subject as may be of interest or of service, I have the honor to submit as follows: —

The general duties of the office, as defined by statute, relate to licenses, inspections, and complaints.

Licenses.

The Inspector is required to annually license all persons who convey milk in carriages or otherwise for the purpose of selling the same within the city, the license fee being fifty cents.

To keep a record of the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person engaged in carrying or selling milk, and the number of the license.

To see that the owner's name, number of his license, and place of business are legibly placed on each outer side of all carriages or vehicles used in the conveyance and sale of milk.

To register the name of every person selling or offering milk for sale in a "store, booth, stand, or market-place" within the city; the registration fee, fifty cents, not being required to be renewed annually.

Number of yearly licenses issued to dealers conveying milk from place to place by carriages or otherwise	681
Number of yearly registrations of drivers employed in carrying or selling milk . . .	496

Notices sent to persons not having their wagons properly marked with name, license number, and place of business		15
Number of licenses issued to store-keepers not previously registered		202
Number of registrations of store-keepers to date,		2,577
Total number of licenses issued		883
Fees received for the same and paid to the City Collector		$441 50

INSPECTIONS.

It is the duty of the Inspector to enter all places where *milk* is stored or kept for sale, and to take samples, which he shall cause to be analyzed or otherwise satisfactorily tested.

To take samples of *butter*, *oleomargarine*, and *cheese*, for the same purpose.

To examine samples of *vinegar*, for strength, purity, and freedom from deleterious substances.

Number of milk inspections	7,915	
Number of oleomargarine and butter inspections	1,717	
Number of vinegar inspections	221	
Total number of inspections		9,853
Number of warnings issued to store-keepers: —		
For milk not of standard quality	1,275	
For oleomargarine not properly marked	126	
For vinegar not of standard quality	84	
Total number of warnings		1,485

COMPLAINTS.

The statutes provide penalties: —

For neglecting or refusing to license or register for the sale of milk.

For selling or exposing for sale adulterated milk; or milk to which water or any foreign substance has been added; or milk produced from sick or diseased cows; or milk produced from cows fed on the refuse of distilleries.

For selling, or offering for sale as pure milk, milk from which the whole or any part of the cream has been removed.

For selling skimmed milk unless from cans or other vessels marked as required by statute.

For selling or exposure for sale, or possession with intent to sell, milk or skimmed milk which is not of standard quality, *i.e.*, containing less than thirteen per cent. of milk solids in the case of whole milk, or less than nine and three-tenths per cent. of milk solids exclusive of fat in the case of skimmed milk.

For obstructing in any manner the Milk Inspector or his assistants in the performance of their duties.

For selling, or exposure for sale, or possession with intent to sell, oleomargarine, butterine, imitation butter, or imitation cheese, unless marked as required by statute.

For the sale, or exposure for sale, as cider vinegar, vinegar which is not made exclusively of apple cider.

For the sale, or exposure for sale, of vinegar containing any artificial coloring matter, or containing any preparation of lead, copper, sulphuric acid, or any ingredient injurious to health.

For the sale of any vinegar not of standard quality, *i.e.*, containing less than four and one-half per cent. of absolute acetic acid, or, in the case of cider vinegar, containing less than two per cent. by weight of cider vinegar solids.

It is the duty of the Inspector to make complaint for any of the offences thus enumerated, which may be brought to his notice as the result of his analyses of samples, or on the information of any person who lays before him satisfactory evidence upon which to sustain such complaint.

Municipal Courts.

Number of complaints		110
Boston	88	
South Boston District	13	
Roxbury District	6	
Charlestown District	7	
East Boston District	6	
Number of convictions		93
Number of complaints dismissed		5
Number of complaints in which warrants were returned "without service"		4
Number of complaints placed on file, on payment of costs		6
Number of complaints pending		2

Superior Court.

Number of cases appealed	66
Number of cases pending	29

Number of convictions	16
Number of complaints dismissed	1
Number of complaints placed on file, on payment of costs	15
Number of complaints *nol. pros'd*	5

Supreme Court.

Number of cases carried up on exceptions	3
Number of cases waiting decision	3

Total number of complaints as follows: —

Milk	105
Oleomargarine	3
Vinegar	2

For violations of laws relating to milk, oleomargarine, and vinegar there have been paid in fines and costs	$2,555 99

STATISTICS.

Number of milk routes in the city of Boston	681
Routes of 1 to 5 cans	205
Routes of 5 to 10 cans	57
Routes of 10 to 25 cans	136
Routes of 25 to 50 cans	193
Routes of 50 to 100 cans	66
Routes of 100 to 200 cans	17
Routes exceeding 200 cans	7
Number of drivers employed	496
Number of wagons employed	619
Number of stores where milk is sold, as reported by the Police Department	1,746
Police Divisions 1, 2, and 8 (North End)	171
Police Division 3 (West End)	166
Police Divisions 4 and 5 (South End)	405
Police Divisions 6 and 12 (South Boston)	357
Police Division 7 (East Boston)	156
Police Divisions 9 and 10 (Highlands)	200
Police Division 11 (Dorchester)	44
Police Division 13 (West Roxbury)	30
Police Division 14 (Brighton)	20
Police Division 15 (Charlestown)	197
Approximate number of persons engaged in the sale of milk	3,000

Number of cows kept within the city limits whose milk is sold	1,548
Approximate number of cows required to furnish the daily supply of milk	25,000
Estimated number of quarts for average daily supply of milk to the city of Boston	178,832
Estimated number of quarts for yearly supply	65,273,680
Estimated annual consumption *per capita*	42 gallons.
Estimated daily cost to consumers	$10,730
Estimated annual cost to consumers	$3,916,420
Estimated annual cost, *per capita*	$10
Annual cost *per capita* for inspection in the city of Boston	2 cents
[1]Estimated number of pounds of butter received in Boston for 1885	24,400,000
Estimated number of pounds of oleomargarine and imitation butter received in Boston for 1885	9,945,000
Estimated valuation of milk (at average price, 6 cents per qt.)	$3,916,420
Estimated valuation of butter (at average wholesale price, 20 cts. per lb.)	$4,880,000
Estimated valuation of oleomargarine, etc. (at average wholesale price, 11½ cts. per lb.)	$1,143,675

[1] The estimates of butter and oleomargarine have been kindly furnished to me by a member of the Boston Produce Exchange who writes as follows: —

On the books of the Boston Chamber of Commerce there is reported as being received during 1885, 147,829 pkgs. of oleo. This represents what was billed on the railroads as oleo. There was also received a large quantity of oleo. billed as butter; this quantity, after careful inquiry, we estimate at 100,000 pkgs. There was made during the year in or near Boston an amount which we estimate at 150,000 pkgs., which figure up as follows: —

Reported received	147,829 pkgs.
Not reported	100,000 "
Made in or near Boston	150,000 "
	"
Total pkgs.	397,829
Estimating the average weight at	25 lbs.
Total pounds	9,945,725
Estimating wholesale value at	11½ c.
Total value	$1,143,758.37

During 1885 there were reported as received in Boston 667,624 tubs and 113,593 boxes of butter. In addition there was received from various sources, such as by express, etc., a quantity which we estimate at 30,000 pkgs., which figure up as follows: —

Reported received	667,624 pkgs.	
Less oleo., billed as butter,	100,000 "	
	567,624 at 40 lbs.	22,704,960 lbs.
Reported received	113,593 boxes at 7lbs. =	795,151 lbs.
Not reported	30,000 pkgs. at 30 lbs.	900,000 lbs.
Total pounds		24,400,111
Average price, 20c.		20
Total value		$4,880,022.20

Quantity of Milk daily supplied to City of Boston, as per Inspector's Reports, from 1862 to 1885: —

1862	15,000	gallons.
1863	16,000	"
1864	16,595	"
1865	15,733	"
1866	16,129	"
1867	17,125	"
1868	17,493	"
1869	19,686	"
1870	20,948	"
1871	23,316	"
1872	24,009	"
1873	25,282	"
1874	26,329	"
1875	34,578	"
1876	34,670	"
1877	30,388	"
1878	27,400	"
1879	28,256	"
1880	29,000	"
1881	33,084	"
1882	33,084	"
1883	35,646	"
1884	36,000	"
1885	44,708	"

Number of Milkmen at present doing business in Boston who have, since the establishment of the office, been complained of for selling adulterated milk: —

For one offence	96
For two offences	26
For three offences	4
For four offences	3
For five offences	2
For six offences	1
For seven offences	1
Total	133

EXPENSES.

From April 6, 1885, to December 31, 1885.

For apparatus for furnishing chemical laboratory (balances, platinum ware, polariscope, microscope, chemical glass-ware, and other scientific instruments)	$1,322 34

For chemical reagents for furnishing laboratory, including material consumed	$139 01
For salaries of Inspector, clerk, laboratory assistant, and two collectors of samples	4,839 72
For printing	267 43
For stationery	59 03
For postage	34 50
For incidental expenses, including samples purchased	166 15
For advertising	48 00
Balance of appropriation	2,263 82
Amount of appropriation	$9,140 00

INCOME.

From April 6, 1885, to December 31, 1885.

From milk licenses	$441 50
From fines and costs, as the result of prosecutions	2,555 99
Total	$2,997 49

RESULT OF INSPECTION.

An examination of the figures of 1,203 analyses given in the report of Dr. B. F. Davenport, Inspector of Milk for 1884, shows that about 40 per cent. of this number were more or less adulterated by the addition of water, or had been reduced below the legal standard for pure milk by the removal of cream. The figures obtained for the year commencing April 6, 1885, the date upon which your Inspector entered upon his duties, did not for several months show any material difference from this result. A decided improvement, however, commenced to manifest itself about the first of July, and has continued to the present time. The following table shows the percentage of adulterated samples in those taken by our collectors from wagons and stores during the months covered by this report: —

Table showing the Percentage of Adulterated Samples of Milk taken from wagons and stores for nine months ending December 31, 1885: —

April and May	38.60 per cent.
May and June	38.91 per cent.
June and July	39.24 per cent.
July and August	30.83 per cent.
August and September	24.04 per cent.

September and October	24.85 per cent.
October and November	19.20 per cent.
November and December	16.19 per cent.

The percentage of adulterated samples has always been found to be much higher in specimens collected from stores than in those collected from wagons.

Percentage of adulterated samples from: —

Stores.	Wagons.
61.42 per cent.	30.20 per cent. for July.
61.54 per cent.	18.20 per cent. for August.
62.08 per cent.	9.26 per cent. for September.
33.68 per cent.	10.45 per cent. for October.
38.14 per cent.	4.97 per cent. for November.
24.63 per cent.	4.83 per cent. for December.

The percentage of adulterated samples for the 9 months covered by this report is 30.64.

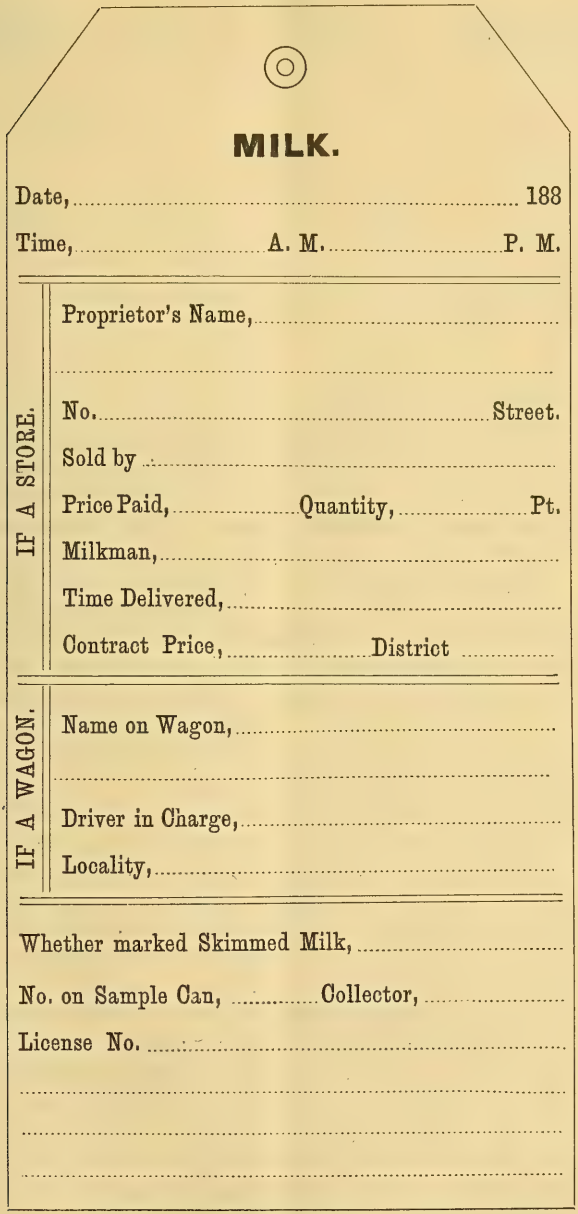
Up to the month of November a considerable number of dealers in oleomargarine, who had neglected to mark their tubs, or papers containing retail sales, were warned personally by the collectors; after that date printed notices were sent, and your Inspector is able, therefore, to give figures for the months of November and December only; but it is very satisfactory to be able to state that, while of 330 inspections made in November, warnings were sent to 56 dealers, in December out of 407 inspections 57 only required notices, being 24.24 per cent. in November and 14 per cent in December.

Of the vinegars analyzed, 38 per cent. proved to be more or less adulterated, or not of standard quality, as regards acid strength.

Methods of Inspection.

The office at present employs two collectors of samples whose duties begin at an early hour of the morning, and which are to take samples of milk from wagons and stores and deliver them to the office. The collectors make no inspection of the milk, but their duties consist wholly in the taking of samples, and the examination of wagons to see that the provisions of the statutes in relation to licenses are complied with. The collectors are each provided with a small hand-bag holding ten pint cans, each of them having a figure stamped upon the handle. A sample of milk being obtained (and the same system is applied to butter and vinegar), a printed tag is securely fastened to the can with a short piece of iron wire. The collector is required to write upon the tag the date, the hour, and the locality where the sample is obtained.

The following represents one of the cards used for milk : —



The reverse of this tag contains the following items: —

Analysis.

Analysis No.
Inspection Page
Specific gravity
Milk solids
Solids not fat
Fat
Milk sugar
Ash
Caseine, etc.
Water
Water added
Cream by volume
Color

The collector records the name upon the wagon, the driver in charge, and the license number. He carefully observes the can from which the sample is obtained, and reports whether or not the can is marked "Skimmed milk." Signing his name or initials he deposits the can in the bag, and proceeds to take other samples, which he labels in a similar manner. The samples, are delivered to the office, where they are received personally by the Inspector or his assistant, who receipts for them by marking each card with the initial letter of his name. The samples are then analyzed, the results of the analysis being written upon the back of the card upon proper spaces prepared for recording the various results obtained. The card is not detached from the can until the examination is completed. The results are copied into books kept for the purpose, while the cards (being the original report of the whole inspection, from the first taking of the sample to its final analysis) are filed away in suitable drawers, arranged alphabetically according to the names of the milkmen. In this way is gradually accumulated a large number of reports, which form a complete card-catalogue (like those adopted in libraries) where at a glance can be found the entire record of any particular dealer for the year. The office employs three varieties of cards — of distinctive colors — for milk (white); for butter (yellow); and for vinegar (buff.) The sample being satisfactory, the card takes its place in the card-catalogue. If unsatisfactory the card is stamped by the analyst with a **W** (warning) in the case of a store, or a **C** (complaint), in case the sample is taken from a wagon. If a store, the following warning notice is sent: —

CITY OF BOSTON.

OFFICE OF INSPECTOR OF MILK, BUTTER AND VINEGAR,
1151 WASHINGTON STREET.

No. 2000.

Boston, ...*188*

You are hereby notified that a sample of milk recently obtained from you has been found on analysis to be of poorer quality than that required by the statutes. You are respectfully notified that the sale of such milk, or the possession or custody of the same, with intent to sell, renders you liable to the penalties provided by the Public Statutes.

Further information will be furnished you on personal application to this office.

Respectfully,

.....

Inspector.

To

.....

Under our statute a store-keeper is equally liable with a milkman for the possession or sale of adulterated milk, but it is thought best to send warnings, because, while there are doubtless some store-keepers who adulterate their milk, the larger number of them sell it as delivered to them. The effect of this notice is to cause the store-keeper to admonish the milkman; in many cases to discharge him; and in almost all instances to produce an immediate improvement of the milk sold.

After two or more warnings are thus sent to the same storekeeper, if the milk is found, within a reasonable time, to be below the standard, the proprietor of the store is complained of; this has been necessary, however, in but a few instances. These warnings are not sent to milkmen.

The City Laboratory.

Until 1884 analyses of milk were made only in those cases where it was expected that complaints would be made in court. These analyses were made by professional chemists outside the office, and were paid for at the rate of ten dollars for each sample. In 1884 the Inspector, Dr. Davenport, being himself an analyst, inaugurated the plan of making his own chemical examinations. A room in the Old Franklin School-building, 1151 Washington street, was partially fitted up for a laboratory, and a large number of analyses of milk, butter, and vinegar were made by the Inspector and his assistants, with much more satisfactory results than under the old plan. At this time all the chemical apparatus employed was the personal property of the Inspector; but at the beginning of the present year (1885) the laboratory was made complete in its furnishings, and all the necessary apparatus for the full analysis of milk, butter, and vinegar was purchased, and is now the property of the city.

The following is a general inventory of the chemical apparatus and instruments belonging to the laboratory: —

2 Becker's chemical balances.
1 Becker's chemical weights.
25 Platinum (milk) capsules.
2 Platinum dishes.
1 Ventzke-Scheibler polariscope.
1 Zentmeyer microscope with 2-inch, $\frac{8}{10}$-inch, $\frac{1}{5}$-inch, and $\frac{1}{10}$-inch objectives.
1 Weisnegg drying-oven.
1 Weisnegg copper oven.
2 large copper water-baths.
1 Fletcher blowpipe.
12 Weisnegg and Bunsen gas-burners.
1 Fischer filter-pump.

Graduated glass-ware, cylinders, litre flasks, burettes, pipettes, clamp-stands and tripods, Feser's lactoscopes, Beaume's hydrometers, specific gravity apparatus, thermometers, lactometers, etc. Chemical glass-ware, flasks, beakers, funnels, test-tubes, porcelain evaporating-dishes, etc.

Methods of Examination.

Specific Gravity. — All samples of milk, when brought to the office, are first examined as to specific gravity and the approximate percentage of fat as given by Feser's lactoscope.

The specific gravity is determined by a delicate Pile's hydrometer, — correction being made for the temperature, and the specific gravity reduced to 15° C. (59° F.) The specific gravity being required at 59° F., a correction is necessary, because, if the milk be *colder* than 59°, the readings of the hydrometer and lactometer are too *high;* while, if the milk be *warmer* than 59°, the readings of these instruments are too *low.* Instead of warming or cooling the milk to the exact degree required, it is more convenient to take the specific gravity at any temperature and reduce it to the proper gravity at the standard temperature. It is approximately correct to *deduct* $\frac{1}{2}$ degree from the specific gravity for each 5 degrees of the thermometer *below* 59°, and *add* $\frac{1}{2}$ degree to the specific gravity for each 4 degrees of the thermometer *above* 59°. This method, however, is correct only for a limited range; but the following tables give the corrected specific gravity for each of the degrees from 1.027 to 1.035 for temperatures from 40° F. to 80° F.

TABLE.—Showing Specific Gravity of Milk at 59° F. for Temperatures below 60° F.

SPECIFIC GRAVITY.	DEGREES OF FARENHEIT'S THERMOMETER.																				
	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1.0270	257	257	258	258	259	259	260	260	261	261	262	263	264	265	266	266	267	268	269	270	271
1.0275	261	261	262	262	263	263	264	264	265	265	266	267	268	269	270	271	272	273	274	275	276
1.0280	266	266	267	267	268	268	269	269	270	270	271	272	273	274	275	276	277	278	279	280	281
1.0285	270	270	271	271	272	273	273	274	275	275	276	277	278	279	280	281	282	283	284	285	286
1.0290	275	275	276	276	277	278	278	279	280	280	281	282	283	284	285	286	287	288	289	290	291
1.0295	279	279	280	280	281	282	282	283	284	284	285	286	287	288	289	291	292	293	294	295	296
1.0300	284	284	285	285	286	287	287	288	289	289	290	291	292	293	294	296	297	298	299	300	301
1.0305	288	288	289	290	290	291	292	293	293	294	295	296	297	298	299	301	302	303	304	305	306
1.0310	293	293	294	295	295	296	297	298	298	299	300	301	302	303	304	306	307	308	309	310	311
1.0315	298	298	299	300	300	301	302	303	303	304	305	306	307	308	309	311	312	313	314	315	316
1.0320	303	303	304	305	305	306	307	308	308	309	310	311	312	313	314	316	317	318	319	320	321
1.0325	307	307	308	309	310	311	311	312	313	314	315	316	317	318	319	321	322	323	324	325	326
1.0330	312	312	313	314	315	316	316	317	318	319	320	321	322	323	324	326	327	328	329	330	331
1.0335	316	316	317	318	319	320	320	321	322	323	324	325	326	328	329	330	331	333	334	335	336
1.0340	321	321	322	323	324	325	325	326	327	328	329	330	331	333	334	335	336	338	339	340	341
1.0345	325	325	326	327	328	329	329	330	331	332	334	335	336	338	339	340	341	343	344	345	346
1.0350	330	330	331	332	333	334	334	335	336	337	338	339	341	342	343	345	346	347	349	350	351

To make use of this table find the specific gravity in the left-hand column and the temperature in the upper horizontal column. The figures found where the lines from each of these meet placed after the figures 1.0 will give the specific gravity at 59° F., *i.e.*, the table shows only the last three figures of the specific gravity.

TABLE.—Showing Specific Gravity of Milk at 59° F. for Temperatures above 60° F.

Specific Gravity.	Degrees of Fahrenheit's Thermometer.																				
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1.0270	271	273	274	275	277	278	279	281	282	283	284	286	287	288	289	291	292	293	294	296	297
1.0275	276	278	279	280	282	283	284	286	287	288	289	291	292	293	294	296	297	298	299	301	302
1.0280	281	283	284	285	287	288	289	291	292	293	295	296	297	299	300	301	303	304	305	307	308
1.0285	286	288	289	290	292	293	294	296	297	298	300	301	302	304	305	306	308	309	310	312	313
1.0290	291	293	294	295	297	298	299	301	302	303	305	306	308	309	311	312	313	315	316	318	319
1.0295	296	298	299	300	302	303	304	306	307	308	310	311	313	314	316	317	318	320	321	323	324
1.0300	301	303	304	305	307	308	309	311	312	313	315	316	318	319	321	322	323	325	327	328	330
1,0305	306	308	309	310	312	313	314	316	317	318	320	321	323	324	326	327	328	330	332	334	335
1.0310	311	313	314	316	317	319	320	322	323	324	326	327	329	330	332	333	334	336	338	340	341
1.0315	316	318	319	321	322	324	325	327	328	329	331	332	334	335	337	338	339	341	343	345	346
1.0320	321	323	324	326	327	329	330	332	333	335	336	338	339	341	343	345	346	347	349	351	352
1.0325	326	328	329	331	332	334	335	337	338	340	341	343	344	346	347	349	350	352	354	356	357
1.0330	331	333	334	336	337	339	340	342	343	345	346	348	350	351	353	355	356	358	360	362	363
1.0335	336	338	339	341	342	344	345	347	348	350	351	353	355	356	358	360	361	363	365	367	368
1.0340	341	343	344	346	347	349	350	352	353	355	356	358	360	361	363	365	366	368	370	372	373
1.0345	346	348	349	351	352	354	355	357	358	360	361	363	365	366	368	370	371	373	375	377	378
1.0350	351	353	354	356	357	359	360	362	363	365	366	368	370	371	373	375	376	378	380	382	384

There are two kinds of lactometers in common use among farmers and milk-dealers, — the Orange county lactometer, graduated from 0 to 25°, and the New York Board of Health lactometer, graduated from 0 to 120°. For convenience of comparison the following table shows the relations between these two instruments and the corresponding specific gravity : —

TABLE. — Showing Comparison of Degrees of Lactometers and Specific Gravity.

Specific Gravity.	Orange County Lactometer.	New York Board of Health Lactometer.
1.0270	17.	93
1.0275	17.5	95
1.0280	18.	97
1.0285	18.2	98
1.0290	18.4	100
1.0295	18.6	102
1.0300	18.8	104
1.0305	19.	105
1.0310	19.3	107
1.0315	19.7	109
1.0320	20.	110
1.0325	20.3	112
1.0330	20.7	114
1.0335	21.	116
1.0340	21.3	117
1.0345	21.7	119
1.0350	22.	120

The Lactoscope. — Feser's lactoscope, which has come into extensive use within the past two years, is a very ready means of determining approximately the percentage of fat in a specimen of milk. Its construction depends upon the fact that the richer the milk in fat the greater is the number of fat globules in a given space, and hence a greater opacity. The instrument consists of a small glass cylinder graduated by lines showing the percentage of fat. Enclosed within the cylinder, near the bottom, is a still smaller cylinder of white glass on which are ruled several black lines. A definite quantity of milk (four cubic centimeters) being placed in the cylinder, successive portions of water are added until (after thorough mixture with each addition) the opacity of the

milk is reduced to a point where the black lines on the small cylinder can be seen without being too distinctly visible. The instrument is so arranged that the figure corresponding to the level of the mixture of milk and water shows the percentage of fat.

The readings of the lactoscope, taken in connection with the corrected specific gravity, make it possible to determine with reasonable certainty whether the milk is very good or very poor; if found to be very good, it is passed; if found to be poor or doubtful, it is analyzed to ascertain its precise character and composition. The accompanying table shows the character of the milk when examined by Feser's lactoscope and the specific gravity.

Specific Gravity.	Per cent. of Fat by Feser's Lactoscope.								
	2	2¼	2½	2¾	3	3¼	3½	3¾	4
1.028	P	P	P	P	P	D	D	D	D
1.029	P	P	P	P	D	G	G	G	G
1.030	P	P	P	P	D	G	G	G	G
1.031	P	P	P	D	G	G	G	G	G
1.032	P	P	D	D	G	G	G	G	G
1.033	P	P	D	G	G	G	G	G	G
1.034	P	P	D	G	G	G	G	G	G
1.035	P	P	D	G	G	G	G	G	G

P = poor. D = doubtful. G = good.

Chapter 57, Section 9, of the Public Statutes (as amended by Chapter 352, Acts of 1885) provides that if milk is shown upon analysis to contain more than eighty-seven per cent. of watery fluid, or to contain less than thirteen per cent. of milk solids, or to contain less than nine and three-tenths per cent. of milk solids, exclusive of fat, it shall be deemed for the purposes of the chapter to be adulterated.

To ascertain these factors the following methods are adopted: —

Milk Solids. — To ascertain the percentage of milk solids, 5 grams of milk are weighed in a flat-bottomed platinum dish 2½ inches in diameter and about ½ inch in depth. The weight of the dish being first ascertained, 5 grams are added to the weights balancing the dish, and the milk (about 5 cubic centimeters) added until the equilibrium is restored. Each dish has a figure stamped upon its side, so that any number of samples may be analyzed at the same time without con-

fusion. The dish containing the milk is placed upon a water bath, the bath being closed at the top by a flat metallic plate. After about two hours the dish is transferred to a drying-oven, where, for perhaps an hour more, it is heated to 105° C. It is then quite dry and is weighed. The weight of the dish with the milk solids being ascertained, the original weight of the dish is subtracted, — giving the weight of the total solids in 5 grams of milk. The percentage (or grams of milk solids in 100 grams of milk) is ascertained by multiplying the weight of solids found by 20.

Milk Solids exclusive of Fat. — The platinum dish with its contents is then filled with petroleum benzine (75° to 80° Baumé), and heated on the water bath as before. The benzine being raised to the boiling point rapidly dissolves the fat (butter). The benzine is then poured off, and more benzine added, boiled, and poured off as before. The benzine is added and poured off three times; the platinum dish is then thoroughly washed with a wash-bottle containing benzine, and after careful drying is weighed. The weight of the dish and contents less the weight of the dish gives the weight of the milk solids exclusive of the fat, the fat having been dissolved and removed by the benzine. This weight multiplied by 20 gives the percentage of solids not fat in 100 grams of milk.

Fat. — The difference between the percentage of solids not fat and the percentage of total solids gives the percentage of fat.

Ash. — The mineral salts contained in milk form what is called the *ash*. To determine this, the dish in which the *solids* and *solids not fat* have been determined is with its contents (solids not fat) heated to a dull red heat till the organic portion of the milk is consumed and the residue is quite white.

The dish and the *ash* are weighed and the percentage determined as before.

Sugar. — It is frequently of advantage to determine the amount of *sugar of milk* in the sample under examination. This is effected by aid of the polariscope. A description of this instrument and the details to be followed in its use are unnecessary at this time. They may be found in a report by Prof. S. P. Sharples, published in the Fourth Annual Supplement to the Report of the Mass. State Board of Health, Lunacy, and Charity (1882, page 47).

Albuminoids. — The sum of the percentages of the *ash*, and the *sugar*, subtracted from the *solids not fat*, gives the *albuminoids* (caseine, etc.).

A convenient form of laboratory note-book, and similar to the one used by this office, showing the details of weighings, is as follows: —

ANALYSIS OF MILK.

No. 3602. *Date,* *July 1, 1885.*

Name, *John Skinner.*

Specific Gravity, 1.0315. *Temp. 66° F.*

Corrected Gravity, *1.0325.* **Fat (Feser),** *3¾*

Cream by Vol., *10 per cent.*

Wt. of Dish and Solids - - -	*18*	*645*	
Wt. of Dish No. 25 - - - -	*17*	*955*	
Grams of Milk 5, Wt. of Solids -		*690*	
Total Solids (per cent.),			*13.80*
Water (per cent.),			*86.20*
Wt. of Dish and Solids (after fat extraction) - - - - - - -	*18*	*445*	
Wt. of Dish - - - - - - -	*17*	*955*	
Wt. of Solids, not Fat - - -		*490*	
Solids not Fat (per cent.),			*9.80*
Fat (per cent.),			*4.00*
Wt. of Dish and Ash - - - -	*17*	*988*	
Wt. of Dish - - - - - - -	*17*	*955*	
Wt. of Ash - - - - - - -		*033*	
Ash (per cent.),			*0.66*
Polariscope reading in 200 mm. tube - - - - - - - -	*100*		
Milk Sugar (per cent.),			*5.00*
Albuminoids (per cent.),			*4.14*
If Colored,			*No.*

In determining the character of any particular sample of milk, consideration should be given to all of the factors of the analysis, and a reasonable margin below the legal limits allowed in determining whether or not the sample should be complained of; but in estimating the relation of a given sample to standard milk, a comparison of the percentage of solids found with 13 (the solids in standard milk) will give the percentage of standard milk in the sample, the difference being added water.

It is to be observed that there is a difference between the percentage of added water *in* a given sample and the percentage of water added *to* one hundred parts of standard milk; thus a milk which on analysis showed 10.40 per cent. of total solids would indicate 20 per cent. of added water *in* a mixture of standard milk and water, — that is, five quarts of such adulterated milk would consist of four quarts of standard milk and one quart of water; but the percentage of water added *to* the four quarts of standard milk would be 25 per cent. instead of 20 per cent., as calculated from the total solids.

TABLE. — Showing the Percentage of Added Water in a Mixture of Standard Milk and Water.

Per cent. of Solids.	Composition.		Per cent. of Solids.	Composition.	
	Added Water.	Standard Milk.		Added Water.	Standard Milk.
12.87	1	99	10.27	21	79
12.74	2	98	10.14	22	78
12.61	3	97	10.01	23	77
12.48	4	96	9.88	24	76
12.35	5	95	9.75	25	75
12.22	6	94	9.62	26	74
12.09	7	93	9.49	27	73
11.96	8	92	9.36	28	72
11.83	9	91	9.23	29	71
11.70	10	90	9.10	30	70
11.57	11	89	8.97	31	69
11.44	12	88	8.84	32	68
11.31	13	87	8.71	33	67
11.18	14	86	8.58	34	66
11.05	15	85	8.45	35	65
10.92	16	84	8.32	36	64
10.79	17	83	8.19	37	63
10.66	18	82	8.06	38	62
10.53	19	81	7.93	39	61
10.40	20	80	7.80	40	60

TABLE. — Showing the Proportion of Water added to Standard Milk in Frequently Occurring Mixtures.

Per Cent. of Solids.	Parts of Water added to Standard Milk.	Per Cent. of Solids.	Parts of Water added to Standard Milk.
12.50	1 to 25	11.14	1 to 6
12.39	1 to 20	10.83	1 to 5
12.19	1 to 15	10.40	1 to 4
11.81	1 to 10	9.75	1 to 3
11.70	1 to 9	8.71	1 to 2
11.55	1 to 8	7.80	1 to 1½
11.37	1 to 7	6.50	1 to 1

The Adulterations of Milk.

Water. — The addition of water, with or without the removal of cream, is the most extensive of the fraudulent practices of the milk dealer. The addition of water to milk is not merely a "commercial fraud," as it is often claimed, for in many cases milk so adulterated may be rendered positively injurious. The addition of water not only disturbs the delicate relations of the various constituents of milk, by which the milk is more readily turned sour, but where the water is drawn from objectionable sources, such as wells in the vicinity of stables, contaminated by sewage or other impurities, it is certain that disease-germs may be introduced. A writer in the "Boston Medical and Surgical Journal" says: —

> Nature always manufactures her fluids in accordance with the most approved rules of chemistry, and any attempts to improve upon her generally cause trouble. Milk is a very complex substance, and at best requires delicate attention to preserve it as such even for a short time, so that any disturbance of the equilibrium existing between the relative proportions of the elements hastens those chemical processess which generate lactic acid, or, in other words, convert it into sour milk. Milk adulterated with water is, therefore, milk no longer; and, although the agent thus employed is by itself harmless, its use in this way is none the less a grave offence both against the health and the pocket of the community.

Charles Girard, Director-General of the Municipal Laboratory of Paris, in his report (*sur les Travaux du Laboratoire Municipal, 1885*), says: —

> It is known that water is a vehicle for contagious diseases; wells, cisterns, recipients of every description which serve for the storage of water, may become charged with organic matters injurious to health. Thus it is that milk, which by itself is very liable to fermentation, becomes dangerous when it is mixed with contaminated water; a great number of ferment germs may be introduced into the milk and develop there with great rapidity. Milk dealers in Paris have been known to add to their cans of milk water taken from the gutter. Such water, infected with germs and putrid matters, constitutes a veritable poison. Diarrhœal diseases, vomitings, and colics are the inevitable sequences of the ingestion of milk adulterated with such material.

That milk does at times carry disease to the human system is beyond question; and it is now certain that the spread of zymotic diseases (typhoid fever, scarlet fever, diphtheria, etc.) has been traced to foul water in milk.

In 1870 Dr. Ballard was able to show that an outbreak of typhoid fever which attacked 175 persons at Islington coincided with the use of milk from a particular dairy. The

same physician, in 1872, found that 51 families where the same disease prevailed were supplied with milk by a single dairyman. In another instance 47 families obtained their milk from two dealers whose dairies were close together, and who used water from the same well. In 1873 an epidemic of typhoid fever broke out at Marylebone. It was found that of 244 cases investigated, 218 were in families having milk from a particular dairy; and it was shown that the water used for dairy purposes was contaminated by the drainage from a dwelling where a person was suffering from typhoid fever immediately before and at the time of the outbreak. In 1875, at Crossbells, a still more striking case occurred. In 40 families using milk from one dealer 18 cases of typhoid fever occurred; while in 42 other families in the same neighborhood which used condensed milk, or none at all, there was not a single case.

At the International Medical Congress, in 1881, Mr. Ernest Hart, of London, read a paper, in which he says: —

> The number of epidemics of typhoid fever recorded in the abstract, as due to milk, is 50; scarlatina, 15; diphtheria, 7. The total number of cases occurring during epidemics, traced to the use of infected milk, may be reckoned, in round numbers, as 3,500 of typhoid fever, 800 of scarlet fever, and 500 of diphtheria.

The "London Lancet," 1883–84, reports 30 cases of typhoid fever, which occurred at Dundee, Scotland, in families supplied by one milkman having three children sick of this disease; also 16 cases of typhoid fever, at Aberdeen, Scotland, in nine families, which were caused by the milk from a dairy where typhoid fever prevailed; 30 cases of typhoid fever, at Penzance, England, were traced to the supply of milk.

An epidemic of similar nature at Port Jervis, N.Y., was caused and spread, according to the fourth annual report of the New York State Board of Health, through the medium of infected milk. It appeared as the result of the investigations of Dr. F. C. Curtis that 87 per cent. of the cases occurred among persons supplied by one milk pedler. It was believed that the milk was infected through the water and cloths used to wash out the cans.

Dr. Newton reports, in the case of an epidemic of typhoid fever at Alleghany City, Pa., in 1883, that the milk supplied to 48 of the infected families was furnished by the same dairy. Dr. Rauth says: —

> The danger of admixture of water with milk has been lately sadly displayed, and justifies the most severe measures of repression which any government could well enact.— *Rauth on Infant Feeding.*

Experiments have shown that milk from animals affected with apthous fever (foot and mouth disease) will, when taken, produce a similar disease in the human subject; and it is more than probable that the same is true of the disease among cattle called anthrax, (malignant pustule in man). The milk of sheep affected with anthrax is known to have produced it in other animals; and it is now considered as well proved that the milk of tuberculous cows is capable of communicating the disease to man.

I am indebted for many of the facts above stated to a valuable report on "Cow's Milk in Reference to its Medical Bearings," by R. D. Clark, M.D., published among the papers printed in the "First Annual Report of the New York State Dairy Commissioner, 1885."

Removal of Cream (Skimming).

The abstraction of the cream (fat) from milk is, next to the addition of water, the most common falsification.

Much of the milk sold in stores is of this sort. It is frequently spoken of as "only taking off a little cream;" but this (to infants) is of far greater consequence than is generally known.

Distinguished medical writers assert that fat is an almost indispensable agent in the formation of blood; that it is largely concerned in the secretion of bile; that no animal cell or fibre can be formed without it; that it is the chief source of muscular force, and probably of nerve force; and that as a heat producer it stands preëminent among the alimentary principles. In view of these facts, says Dr. R. D. Clark of New York: —

> We see that milk fat is one of the most, if not the most, important ingredients of an infant's food; indeed it is essential, in large quantities, to its proper nourishment, and consequently a deficiency of it cannot but produce serious results.

Skimmed milk has, no doubt, for adults, a certain food-value; but the alleged "advantage to the poorer classes," and other specious pretences by which interested persons seek to justify its sale, are more than overbalanced by the fraud and deception which the sale of skimmed milk makes possible. *If* honest skimmed milk were sold at the price at which it ought to be furnished, and *if* the purchasers of it were made to clearly understand what they were buying, there might be no objection to its sale; but it is safe to say that, of the so-called skimmed milk sold in Boston, not one-tenth part is

sold for what it is, but, on the contrary, the greater portion constitutes what is known as "store-milk," and in almost every instance is sold as pure.

I regret to say that, under the present statutes of Massachusetts this fraud is easily committed, and very difficult of detection.

Section 7, Chapter 57, of the Public Statutes (as amended by Chapter 352 of the Acts of 1885) provides that:—

> No dealer in milk, and no servant or agent of such a dealer, shall sell, exchange, or deliver, or have in his custody or possession with intent to sell, exchange, or deliver, milk from which the cream or any part thereof has been removed, unless, in a conspicuous place above the centre, upon the outside of every vessel, can, or package from or in which such milk is sold, the words "**SKIMMED MILK**" are distinctly marked in uncondensed Gothic letters not less than one inch in length.

This at first sight would seem to be ample protection, but its practical working demonstrates that it furnishes protection only to dishonest store-keepers and milkmen, and enables both to perpetrate a gross fraud upon the unsuspecting public.

There are some dealers in Boston, whose cans are, all of them, marked "skimmed milk." This at once almost completely nullifies any efforts of the inspector to protect the families or honest store-keepers to whom such milk may be sold as pure. A sample of milk taken from a can so marked cannot be of service to convict the milkman, because it is obviously impossible (except in a few cases of infrequent occurrence) to *prove* that he intended to sell it as pure milk; yet this, in very many instances, is precisely what he intends and what he does. Such men do not hesitate to admit that they mark their cans to "get 'round the law." A not uncommon practice of some of these men is to have labels with the words "skimmed milk" stamped upon a piece of tin, which, by means of a hook or ring, is easily fastened to a can and as easily detached. These labels are hung upon the cans while upon the wagon, or during the time that the inspector may be about; but just before the can is delivered the mark is removed, and made to serve its dishonest purpose upon other cans. I am informed that this practice prevails in other cities as well as Boston. Many storekeepers buy this "store-milk" well knowing its character; but by keeping the can in an ice-chest they give the customer no opportunity to observe the marking, or to suspect the true character of the milk. I am of the opinion that the only effective remedy for these abuses is to repeal the section of the statute (Chap. 57, Sect. 7) in relation to skimmed milk, or at least to so

amend it as to prevent the sale of skimmed milk at retail, as in New York, where the laws require that all milk shall have at least three per cent. of fat. From personal conversation with many dealers I am satisfied that a great majority of them would be pleased to have this accomplished.

The editor of the (London) "Analyst," in commenting upon the results of a trial for the sale of skimmed milk in New York, says: —

> The prosecution was brought under one of the ordinances prohibiting skim-milk from being held for sale in New York City, etc. The reason for such action is that milk supplied, for instance, in the morning to customers might be in cans plainly marked "skim-milk" without the actual purchaser really seeing them and knowing that he was being supplied with skim-milk. Also, the cans might be placed behind a counter, or, as in the above case, in ice-tubs, so that the mark on the cans, of "skim-milk," might be concealed from the purchaser. To permit the sale of skim-milk from cans, even when conspicuously marked as containing it, seemed to open the door to too much possible fraud, and its sale therefore has been prohibited.

In France, a commission of distinguished scientists to whom was referred a series of questions relative to the sale of milk, in response to an inquiry whether or not the sale of skimmed milk should be prohibited, reported: —

> This question is not a new one, and is already answered by the police ordinances, which prohibit the sale of skimmed milk. The commission, without hesitation, approve this legislation. Milk is one of the most perfect foods which nature has given to man; it contains all the elements necessary to the sustenance of the organism, since it is alone sufficent for the food and development of the child during the first year of its existence. The diverse substances which enter into its composition are found in such proportions as are exactly suited to alimentation, and the harmony of these proportions cannot be disturbed with impunity. Now this harmony is destroyed when milk is skimmed; that is to say, when it is deprived of one of its most valuable elements,—the fatty matter or cream. But, since there is a considerable demand for cream, the question is asked, May not the skimmed milk be sold; it is still a nourishing food, and it would be a pity not to make use of it? To this objection it is easy to reply that skimmed milk may be used for feeding to animals or in the manufacture of cheese; to permit its sale would be to introduce a product of inferior food value, and increase the difficulties, already too great, which attend the surveillance of the sale of milk.

To the inquiry they reply specifically: —

> That skimmed milk, being deprived of a portion of the fat which it naturally contains, should still be considered as a falsified milk, and as such excluded from legitimate commerce.

Colored Milk.

Not less common than skimming and watering is the fraud of colored milk. For the purpose of coloring, an alkaline

solution of *annatto*, under the name of "Benefit," the sale of which should be prohibited by statute, has come into extensive use, this article having to a considerable extent displaced the burnt sugar, or *caramel*, formerly employed. It is generally admitted that both of these substances are harmless; but their use under any circumstances is none the less a cheat, for they are never used except to cover adulteration, or, in the case of milk otherwise pure, to make it appear to be better than it really is.

Martin and Waller give the following process for the detection of annatto: Evaporate 200 to 500 cubic centimetres of milk nearly to dryness, and extract the residue with alcohol. This alcoholic solution evaporated to a small bulk turns brown with acids, and yellow with alkalies; or concentrated sulphuric acid may be added, drop by drop, when, if annatto be present, a blue color is formed, deepening into dark-brownish purple on standing.

Boracic Acid, Salicylic Acid, and other Preservatives.

Within a few years many so-called "preservatives" have been offered for sale, all of which are more or less objectionable, and especially as an addition to milk or cream. The use of *salicylic acid* in any article of food is expressly prohibited by the Paris police ordinances, and the health authorities of Brooklyn, N.Y., have stopped the sale of an article containing *boracic acid*. It has been claimed that boracic acid is harmless; but this is a matter which is, to say the least, debatable, and no physician would countenance its use as an addition to an infant's food. Very large quantities of it are consumed as a preservative for cream. Unfortunately there is no special law for the punishment of the adulteration of cream. On this subject, Dr. William K. Newton, health officer of Paterson, N.J., says: —

> The mere fact that a certain chemical combination will check fermentation or putrefaction outside of the body leads us to believe that digestion will be impaired or impeded. This I have sought to prove, in an imperfect way, by treating milk with a preservative, and then attempting artificial digestion. Digestion was proved to be interfered with, or checked altogether.

There are other less important substances used in the adulteration of milk, as *salt*, *sugar*, *starch* (rarely), *bicarbonate of soda*, the employment of which calls for no special remark at this time. The four principal frauds practised in the sale of milk are, as before stated, watering, skimming, coloring, and the use of preservatives. Either of these

adulterations deserves the fullest condemnation, and merits severe and summary punishment.

The Milk Standard.

The Public Statutes of Massachusetts declare that a bushel of wheat shall weigh 60 pounds (Chap. 60, Sect. 22); of corn, 56 pounds; of potatoes, 60 pounds (Sect. 61); of timothy or herd's grass-seed, 45 pounds (Sect. 67). They establish a standard for the illuminating power of the gas supplied by corporations (Chap. 61, Sect. 14); that burning oils shall be of a certain quality (Chap. 102, Sect. 69); that vinegar shall be of not less than a certain acid strength (Chap. 150, Acts of 1885). They have in like manner established a standard for milk, which has been declared to be at least 13 per cent. of solids, and not less than 9.3 per cent. of solids exclusive of fat. This milk standard has been the subject of much discussion during the past season. There is a certain class of dealers who claim that it is too high, although by far the larger number of producers and dealers consider it just and reasonable.

The public have a right to demand that the milk supplied to them shall be of good *average* quality; and it is asserted that the present standard in Massachusetts is precisely this, and no more. The following table gives the average composition of milk as given by a considerable number of observers: —

Average Composition of Cows' Milk.

AUTHORITY.	Total Solids.	Fat.	Not Fat.	Ash.
BOUDET. — Average proposed and adopted August 27, 1857, by the *Conseil d'Hygiene*, Paris	13.00	4.00	9.00	0.70
ADAM. — Composition of milk from five districts near Paris	13.10	4.10	9.00	0.70
BABCOCK. — (Milk inspector of Boston, 1885) Average of 130 samples	13.11	3.45	9.66	
GIRARD. — Average of all the authorities quoted. (Report of Paris Municipal Laboratory.)	13.30	4.00	9.30	0.70
BOUCHARDAT. — Mean of a large number of analyses. (*Traité d'Hygiene*, p. 136.)	13.30	4.10	9.20	0.70
DAVENPORT. — (Milk Inspector of Boston, 1884). Mixed milk of 31 cows	13.32	3.70	9.62	
CAMERON. — Average composition of milk from 42 cows at Agricultural Institute, Dublin	13.40	4.00	9.40	0.70
WURTZ. — Average of a large number of analyses. (*Dictionnaire de Chimie*, Vol. II. p. 192–194.)	13.50	4.00	9.50	0.60
BELL. — Average of 181 cows from 17 farms. (The "Analyst, 1877")	13.60	3.70	9.90	0.76
MARTIN & MOELLER. — Average of 296 cows from different sections of New York State. (Report on Milk and its Adulterations, New York, 1885)	13.73	4.21	9.52	0.71
NEWTON. — Average of 85 dairies in different sections of New Jersey	13.80	4.22	9.58	0.65
SHARPLES. — Average of 19 cows ("Proc. Amer. Acad. Sciences," 1875)	14.49	4.83	9.66	0.66
Average of all of the above-mentioned authorities	13.46	4.03	9.43	0.69

The following analyses are the results of the examinations of 130 samples of milk from dealers in the city of Boston during the latter part of the year 1885, made for the purpose of determining the *average* composition of the milk as supplied from wagons: —

ANALYSES OF MILK.

Wednesday, Oct. 28, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
C. P. Farnsworth	1.0340	14.30	10.60	3.70
H. R. Richardson	1.0345	14.28	10.74	3.54
G. L. Peirce	1.0345	14.04	10.88	3.16
Graustein Bros.	1.0325	13.44	9.78	3.66
M. P. Merriam	1.0325	13.38	9.82	3.56
S. Peirce	1.0335	13.02	10.12	2.90
J. R. Mitchell	1.0325	12.80	9.76	3.04
O. G. Kinsman	1.0330	12.68	9.62	3.06
C. F. Crosby	1.0320	12.40	9.28	3.12
Joseph Buckley	1.0320	12.30	9.38	2.92
Average		13.264	9.998	3.266

Thursday, Oct. 29, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
G. H. Savage	1.0330	13.60	10.02	3.58
H. L. Millis	1.0340	13.58	9.94	3.64
E. Burnett	1.0335	13.26	9.86	3.40
F. J. Russell & Co.	1.0340	13.06	10.30	2.76
F. E. Fisher	1.0325	13.00	9.98	3.02
R. E. Whittle	1.0340	13.00	10.08	2.92
Geo. Wilde	1.0315	12.20	9.30	2.90
M. M. Raymond	1.0315	12.20	9.44	2.76
C. M. Hamilton	1.0295	11.74	8.84	2.90
Frank D. Tarlton	1.0320	11.54	9.10	2.44
Average		12.718	9.686	3.032

Wednesday, Nov. 4, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
T. Commins	1.0330	14.06	9.66	4.40
Graustein Bros.	1.0330	13.96	9.94	4.02
L. E. Daniels	1.0325	13.72	9.80	3.92
F. W. Hale	1.0320	13.64	9.80	3.84
J. F. Browne	1.0325	13.52	10.04	3.48
C. F. Hobbs	1.0330	13.40	9.98	3.42
S. Peirce	1.0335	13.32	10.18	3.14
S. D. Waugh	1.0310	13.18	9.18	4.00
C. W. Harris	1.0315	12.60	9.10	3.50
W. H. Stodder	1.0315	12.48	9.46	3.02
Average		13.388	9.714	3.674

Thursday, Nov. 5, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
J. H. Lyons	1.0325	13.50	9.34	4.16
R. F. Cheney	1.0325	13.46	9.98	3.48
G. E. Farmer	1.0330	13.42	9.88	3.54
Gay & Wilbur	1.0335	13.40	9.90	3.50
R. E. Young	1.0330	12.78	9.62	3.16
W. L. Russell	1.0330	12.68	9.38	3.30
William Keefe	1.0330	12.56	9.44	3.12
D. Whiting & Sons	1.0320	12.50	9.22	3.28
J. D. Freeman	1.0320	12.44	9.54	2.90
S. M. Lawrence	1.0310	11.58	9.08	2.50
Average		12.832	9.538	3.294

Saturday, Nov. 7, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
A. Hager	1.0330	13.88	9.82	3.96
S. Greene	1.0340	13.36	10.30	3.06
L. B. Chandler	1.0335	13.12	9.88	3.24
Fred Preston	1.0330	13.00	9.74	3.26
S. B. Castner	1.0335	12.94	10.00	2.94
J. R. Mitchell	1.0320	12.70	9.54	3.16
Walter H. Smith	1.0325	12.64	9.96	2.68
J. E. Garmon	1.0325	12.34	9.54	2.80
F. J. Russell	1.0330	12.18	9.66	2.52
J. W. Kimball	1.0300	11.58	8.94	2.64
Average		12.764	9.738	3.026

Wednesday, Nov. 11, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
S. J. Eames	1.0350	14.32	10.68	3.64
H. L. Millis	1.0340	13.76	10.04	3.72
E. W. Farrell	1.0335	13.36	9.84	3.52
E. W. Reed	1.0340	13.36	10.24	3.12
Geo. F. Andrews	1.0335	13.14	9.90	3.24
J. W. Moore	1.0315	12.76	9.40	3.36
James Love	1.0310	12.62	9.74	2.88
E. Baker	1.0335	12.56	9.60	2.96
L. Mank	1.0315	12.54	9.04	3.50
E. H. Raymond	1.0320	12.16	9.26	2.90
Average		13.058	9.774	3.284

Friday, Nov. 13, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
G. & H. Mylod	1.0325	14.20	9.84	4.36
C. C. Moulton	1.0335	13.92	10.04	3.88
O. S. Bailey	1.022	13.46	9.66	3.80
L. Catlin	1.0330	13.14	9.70	3.44
C. E. Draper	1.0330	12.88	9.64	3.24
George Wilde	1.0320	12.66	9.84	2.82
Stevens & Perkins	1.0325	12.62	9.38	3.24
E. L. Knapp	1.0310	12.52	9.08	3.44
T. C. Myron	1.0320	12.50	9.40	3.10
E. T. Pond	1.0310	11.98	8.70	3.28
Average		12.988	9.528	3.460

Tuesday, Nov. 17, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
H. G. O. Bowers	1.0330	13.80	10.30	3.50
D. Whiting & Sons	1.0330	13.74	9.74	4.00
Graustein Bros.	1.0320	13.70	9.40	4.30
M C. Waterman	1.0325	13.58	9.92	3.66
Geo. F. Andrews	1.0330	13.12	9.46	3.66
A. Stearns	1.0330	13.00	9.76	3.24
Fred Preston	1.0320	12.80	9.34	3.46
W. G. Childs	1.0315	12.54	9.38	3.16
J. F. Browne	1.0325	12.34	9.54	2.80
P. J. Lyons	1.0340	11.14	9.68	1.46
Average		12.976	9.652	3.324

Tuesday, Dec. 1, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
A. L. Dutton	1.0290	17.36	9.06	8.30
F. E. Cousins	1.0330	13.92	10.08	3.84
W. A. Grover	1.0320	13.84	9.68	4.16
C. A. Hall	1.0335	13.68	10.08	3.60
J. F. Browne	1.0340	13.58	10.06	3.52
J. F. Sworer	1.0315	13.48	9.44	4.04
D. Whiting & Sons	1.0325	13.44	9.60	3.84
Quigg Bros.	1.0340	13.42	9.76	3.66
A. Stearns	1.0335	13.26	9.50	3.76
C. A. Hall	1.0330	13.00	9.66	3.34
Average		13.898	9.692	4.206

Thursday, Dec. 10, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
T. Commins	1.0330	13.66	9.88	3.78
J. F. Browne	1.0330	13.64	9.66	3.98
J. H. Garmon	1.0325	13.24	9.92	3.32
C. F. Hobbs	1.0320	13.18	9.90	3.28
F. W. Hale	1.0330	12.94	9.40	3.54
Geo. B. Huse	1.0320	12.76	9.34	3.42
E. A. Howe	1.0295	12.74	9.30	3.44
E. E. Boyden	1.0330	12.70	9.80	2.90
G. H. Butterfield	1.0320	12.58	9.52	3.06
G. F. Bowers	1.0310	12.02	9.06	2.96
Average		12.946	9.578	3.368

Friday, Dec. 18, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
J. A. McKim	1.0315	14.28	9.22	5.06
F. Bemis	1.0330	13.42	9.68	3.74
J. F. Browne	1.0330	13.32	9.70	3.62
J. W. Dinsmore	1.0320	13.18	9.30	3.88
B. L. Bowen	1.0330	13.14	9.62	3.52
D. Whiting & Sons	1.0325	13.04	9.32	3.72
Geo. B. Huse	1.0335	12.90	9.82	3.08
Jos. Buckley	1.0310	12.76	9.18	3.58
W. G. Green	1.0320	12.76	9.60	3.16
C. H. Stearns	1.0330	12.50	9.18	3.32
Average		13.130	9.462	3.658

Wednesday, Dec. 23, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
L. A. Stearns	1.0340	13.48	9.80	3.68
W. H. Murdock	1.0335	13.46	9.70	3.76
F. F. Lane	1.0360	13.32	10.48	2.84
S. Woods	1.0345	13.38	10.10	3.28
A. Tuttle	1.0325	13.30	9.44	3.86
F. E. Murdock	1.0335	13.00	9.70	3.30
Bennett & Beckman	1.0330	13.00	9.96	3.04
H. I. Hicks	1.0345	12.90	9.80	3.10
C. T. Witt	1.0320	12.56	9.28	3.28
J. W. Ordway	1.0320	12.10	9.34	2.76
Average		13.050	9.760	3.290

Wednesday, Dec. 30, 1885.

NAME.	Specific Gravity.	Total Solids.	Not Fat.	Fat.
Southward Bros.	1.0305	15.18	9.44	5.74
F. P. Nichols	1.0320	14.78	9.64	5.14
F. L. Stowell	1.0330	14.40	9.50	4.90
Wm. McCarthy	1.0350	14.10	10.48	3.62
A. Tuttle	1.0310	13.40	9.16	4.24
Bennett & Beckman	1.0335	13.30	9.76	3.54
S. Woods	1.0335	13.16	9.48	3.68
F. E. Murdock	1.0325	13.10	9.54	3.56
H. I. Hicks	1.0345	12.76	9.74	3.02
B. D. Sheehan	1.0305	12.00	9.18	2.82
Average		13.618	9.592	4.026

The above samples represent all of the specimens brought in by one collector on the early morning trip on the days mentioned. Several of the samples were found to be adulterated, and complained of in the courts. The samples were taken from milk-wagons as the milk was being delivered. Some of the samples were marked "skimmed milk," and some had evidently been skimmed, though no marks to that effect appeared.

SUMMARY.

DATE.	Total Solids.	Not Fat.	Fat.
October 28, 1885	13.26	9.99	3.26
October 29, 1885	12.71	9.68	3.03
November 4, 1885	13.38	9.71	3.67
November 5, 1885	12.83	9.53	3.29
November 7, 1885	12.76	9.73	3.02
November 11, 1885	13.05	9.77	3.28
November 13, 1885	12.98	9.52	3.46
November 17, 1885	12.97	9.65	3.32
December 1, 1885	13.89	9.69	4.20
December 10, 1885	12.94	9.57	3.36
December 18, 1885	13.13	9.46	3.65
December 23, 1885	13.05	9.76	3.29
December 30, 1885	13.61	9.59	4.02
Average from 130 milkmen	13.11	9.66	3.45

These results give rise to the following pertinent question: If the average composition of the milk (some of which had been skimmed and watered) delivered by 130 milkmen (about one-fifth the whole number) in Boston shows 13.11 total solids and 9.66 of solids not fat, is it not fair that the standard should be 13 per cent. of solids and 9.3 per cent. of solids not fat?

John E. Russell, secretary of the Massachusetts State Board of Agriculture, in the Thirty-second Annual Report (Mass. Pub. Docs., V. I., No. 4, p. 9), says: —

> The greater part of the milk received from farms is above the requirements of the Massachusetts standard.

The question is frequently asked, "Are there not cows, under various conditions of feed, season, etc., whose milk does not come up to this standard?" To this we answer, Yes; but the number of such cows is greatly overrated, and in any case the right of the public to demand milk of "good average quality" remains the same. Whoever buys a barrel of potatoes, a tub of butter, a ton of coal, or any other commodity of daily use and necessity, has a right to expect that the articles furnished shall be of "good average quality." There is no reason why milk should be an exception. In the case of State *vs.* Wayland Smith (Rhode Island Reports, Vol. XIV., p. 100), the opinion of the Supreme Court of Rhode Island upon this subject is as follows: —

> It is equally a fraud on the buyer, whether the milk which he buys was originally good, and has been deteriorated by the addition of water, or whether in the natural state it is so poor that it contains the same proportion of water as that which has been adulterated. Again, since it may sometimes happen, though we presume infrequently, that milk as it comes from the cow is below the standard required by Section 3, it would manifestly be difficult for the prosecution to prove that its poor quality was due to adulteration, although in a very large majority of cases such would probably be the fact. By putting such milk in the same category with adulterated milk, the prosecution is relieved from the difficulty, and a loophole for the escape of offenders is closed. If a cow habitually gives milk of a quality so poor as to come within the statute, or, as the defendant puts it, in his brief, so poor that, as a commercial commodity, it is valuable only for the purposes of irrigation, she is of no value as a milk producer, and can have none as such to her owner, unless he can sell her milk to his unsuspecting neighbors for a price greatly in excess of its value, a species of fraud which ought not to be tolerated. The section[1] is but a slight extension of the provision which prohibits the sale of adulterated milk, and, like that, was designed to protect the public against imposition.

[1] The section establishes a standard for milk.

Pure and Imitation Butter.

While in some States, as Maine, New York, Pennsylvania, Minnesota, and Missouri, laws have been enacted prohibiting the sale of compounds made in imitation of or as a substitute for butter, in Massachusetts, the sale of these goods has been permitted, provided the tubs and packages containing them were plainly marked. Until 1885 the statute required the marking to be in letters "not less than one inch in length." No specification was made as to the width of the letter, consequently dealers very soon discovered that thin skeleton letters placed very closely together complied with the statute, or, at least, so far complied with it as to make conviction by a jury difficult or impossible. This was remedied by the last Legislature, in an amendment which required the marking to be in "uncondensed Gothic letters not less than one half inch in length." This provision has been very generally complied with, although there is still at times great carelessness and negligence among some of the dealers who handle these goods.

In the chemical examination of butter, several processes have been proposed, among the most important being that of Hehner, based on the percentage of insoluble fatty acids present in any given sample, which should not be more than ninety per cent. and the method of Koettstorfer, which depends upon the amount of potassium hydrate required for saponification, not less in the case of pure butter than 0.221 grams for 1 gram of the specimen examined.

The process which thus far appears to be the most satisfactory, in rapidity and simplicity of operation, and giving concordant results, capable of detecting with certainty smaller proportions of foreign fats (beef or pork) than any other is Meissl's modification of Reichert's method, which is based on a determination of the amount of volatile fatty acids obtained by following a particular method of manipulation. For this purpose 5 grams of the thoroughly mixed butter is weighed out on a double filter paper, and then transferred to an Erlenmeyer flask; 10 cubic centimetres of an alcoholic solution of potassuim hydrate (2 grams of potassium hydrate in 10 cubic centimetres of alcohol of 70 per cent.) are then added, and the mixture heated on a water-bath with frequent agitation until saponification is complete and the alcohol fully evaporated.

The last traces of alcohol are readily removed by forcing air into the flask by means of a foot-bellows. 100 cubic centimetres of water are added to the contents of the flask, and after the further addition of 50 cubic centimetres

of diluted sulphuric acid (10 acid, 90 water) the flask is connected with a Liebig's condenser, and 100 cubic centimeters distilled. A current of air forced through the apparatus prevents the violent ebullition and bumping which otherwise occurs.

The distillate is titrated with a decinormal solution of sodium hydrate. Meissl found that forty-nine butters gave distillates, which required from 27 to 31.8 cubic centimetres of normal soda solution for saturation.

The following analyses of oleomargarine and butter are examples of the results obtained by this method: —

Oleomargarine.

Name.	Cubic centimetres required of 1-10 normal solution to neutralize volatile acids from 5 grams.
E. S. Emerson, Broadway, South Boston	1.10 c.c.
Carlton & Saunders, 80 So. Market st.	2.75 c.c.
C. A. Wolcott, 594 Shawmut avenue	1.05 c.c.
Frank Batchelder, 2 Lakeman Market	3.50 c.c.
Fat	83.90
Curds	1.13
Ash	5.76
Water	9.21
N. C. Skelton, 3 Blackstone street	3.80 c.c.
G. Oneto, 123 North street	1.15 c.c.
J. Ponti, 161 North street	1.00 c.c.

Butter.

Name.	Cubic centimetres required of 1-10 normal solution to neutralize volatile acids from 5 grams.
C. Brigham & Co., 386 Tremont street	28.15 c.c.
H. L. Millis, Shawmut avenue, near Dover street,	29.75 c.c.
P. Raferty, 52 K street, South Boston	31.3 c.c.
J. R. Flanigan, 1502 Washington street	29.05 c.c.
A. B. Robinson, corner Park and Warren streets,	27.00 c.c.
H. McEwen, 228 Dudley street	30.25 c.c.
M. Coroglia, 37 North square	29.85 c.c.
George H. Bond & Co., 471 Broadway, South Boston	31.90 c.c.

VINEGAR.

Chapter 307, Acts of 1884, as amended by Chapter 150, Acts of 1885, provide penalties for the sale or exposure for sale, etc., of any vinegar containing any artificial coloring matter, or less than $4\frac{1}{2}$ per cent. of absolute acetic acid, or in the case of cider vinegar containing less than 2 per cent. of cider vinegar solids.

The use of sulphuric acid as an agent for strengthening vinegar is now very uncommon. The practice, however, of offering as cider vinegar a cheap, acetic-acid vinegar, or a malt or glucose vinegar, colored, and fixed up with cider jelly, or the residue of boiled cider, is quite general with a certain class of manufacturers. This and the coloring of "white wine" vinegar are the principal frauds now practised. The methods for the examination of vinegar and detection of adulterations have been very fully given in former reports of this office by Dr. Davenport, and it is unnecessary to refer to them in detail at the present time.

The following are the results of the analyses of the first hundred samples of vinegar examined, and will give an idea of their general character and strength.

Results of the Analyses of 100 Samples of Vinegar in 1885.

No.	Kind of Vinegar.	Per cent. of Anhydrous Acetic Acid.	Per cent. of Residue.	Sulphate of Calcium.	Chlorides.	Remarks.
1	Cider	4.89	2.94	—	—	Standard.
2	Cider	5.03	2.68	—	—	"
3	Cider	4.33	2.45	—	—	Below standard.
4	Cider	3.77	0.40	—	—	Spurious.
5	Cider	3.35	0.36	—	—	"
6	Cider	4.33	2.29	—	—	Below standard.
7	Cider	4.33	0.54	—	—	Spurious.
8	Cider	4.33	0.94	—	—	"
9	White Wine	4.19	0.59	—	—	Colored.
10	White Wine	4.12	—	—	—	Below standard.
11	Cider	4.26	0.54	—	—	Spurious.
12	Cider	4.33	—	—	—	Below standard.
13	Cider	4.33	—	+	+	Spurious.
14	Cider	4.33	1.85	+	+	"
15	Cider	4.33	2.97	+	+	"
16	Cider	3.91	2.45	+	—	"
17	Cider	4.54	1.02	+	+	"

No.	Kind of Vinegar.	Per cent. of Anhydrous Acetic Acid.	Per cent. of Residue.	Sulphate of Calcium.	Chlorides.	Remarks.
18	Cider	4.39	—	+	+	Spurious.
19	Cider	4.68	1.76	+	+	"
20	Ciner	3.49	0.05	—	—	"
21	Cider	4.61	2.50	+	+	A mixed vinegar.
22	Cider	4.06	—	—	—	Below standard.
23	Cider	4.40	—	+	—	Spurious.
24	Cider	4.33	3.07	+	+	"
25	Cider	4.19	2.96	—	—	Below standard.
26	Cider	4.26	1.20	+	+	" "
27	Cider	4.40	1.08	—	+	" "
28	White Wine	6.01	—	+	+	Commercial acetic acid.
29	Cider	5.59	0.82	—	+	Spurious.
30	Cider	5.31	2.57	—	—	Standard.
31	Cider	4.33	3.33	—	—	Below strength.
32	Cider	5.24	2.35	—	—	Standard.
33	Cider	4.12	2.77	—	—	Below standard.
34	White Wine	4.47	—	—	+	Fair.
35	White Wine	6.43	—	—	—	"
36	White Wine	5.17	—	—	+	"
37	White Wine	4.89	—	—	+	"
38	White Wine	4.47	—	—	+	"
39	White Wine	5.73	—	—	—	Standard.
40	White Wine	3.42	—	—	+	Below standard.
41	White Wine	4.19	—	—	+	" "
42	White Wine	5.59	—	—	+	Fair.
43	White Wine	4.75	—	—	+	"
44	White Wine	4.40	—	—	+	"
45	White Wine	4.47	—	—	+	"
46	White Wine	4.19	—	—	+	Below standard.
47	White Wine	4.12	—	—	—	" "
48	Cider	3.77	0.28	—	—	Spurious.
49	Cider	4.05	0.49	—	—	"
50	Cider	4.33	0.94	—	—	"
51	Cider	4.33	1.54	—	+	"
52	Cider	4.05	1.26	—	+	"
53	Cider	3.98	0.34	—	—	"
54	Cider	3.35	0.28	—	—	"
55	Cider	4.47	1.36	—	+	"

No.	Kind of Vinegar.	Per cent. of Anhydrous Acetic Acid.	Per cent. of Residue.	Sulphate of Calcium.	Chlorides.	Remarks.
56	Cider	4.54	2.27	—	—	Standard.
57	Cider	5.31	2.93	—	—	"
58	Cider	2.75	0.14	—	+	Spurious.
59	Cider	4.19	2.77	—	—	Below strength.
60	Cider	3.91	0.30	—	—	Spurious.
61	White Wine	5.73	—	—	—	Standard.
62	Cider	4.47	2.45	—	—	Fair.
63	Cider	4.33	3.26	—	—	Below standard.
64	Cider	2.62	0.92	—	—	Spurious.
65	Cider	3.70	0.13	—	—	"
66	Cider	2.09	3.58	—	—	Unchanged cider.
67	Cider	3.28	0.34	—	—	Spurious.
68	Cider	4.19	1.26	—	+	"
69	Cider	4.61	3.85	—	—	Standard.
70	Cider	4.33	3.83	—	—	"
71	Cider	4.96	2.28	—	—	"
72	White Wine	4.19	—	+	+	Commercial acid.
73	Cider	3.42	0.27	—	—	Spurious.
74	Cider	3.56	0.41	—	—	"
75	Cider	3.77	0.41	—	—	"
76	Cider	3.77	0.25	—	—	"
77	Cider	4.19	0.25	—	—	"
78	Cider	3.15	0.20	—	—	"
79	Cider	3.91	0.30	—	—	"
80	Cider	3.77	0.20	—	—	"
81	Cider	4.02	0.33	—	—	"
82	Cider	5.17	3.55	—	—	Standard.
83	Cider	4.05	0.35	—	—	Spurious.
84	White Wine	3.91	—	—	—	Below strength.
85	White Wine	3.69	—	—	+	" "
86	White Wine	4.54	—	—	—	Standard.
87	White Wine	5.05	—	—	—	"
88	White Wine	4.89	—	—	—	"
89	White Wine	6.78	—	—	+	Fair.
90	White Wine	4.75	—	+	+	"
91	White Wine	5.73	—	—	+	"
92	Cider	4.26	2.55	+	+	Spurious.
93	Cider	3.84	0.24	—	—	"

No.	Kind of Vinegar.	Per cent. of Anhydrous Acetic Acid.	Per cent. of Residue.	Sulphate of Calcium.	Chlorides.	Remarks.
94	Cider	3.77	0.17	—	—	"
95	Cider	4.82	2.10	+	+	"
96	Cider	4.78	1.47	+	+	"
97	Cider	4.68	2.52	—	—	Standard.
98	Cider	4.61	2.94	—	—	"
99	Cider	4.75	2.82	—	—	"
100	Cider	5.17	2.57	—	—	"

I have placed in an appendix a table showing the organization of this department from 1859 to 1885, copies of the statutes relating to the inspection and sale of milk, butter, cheese, and vinegar, and reports of several decisions of the Supreme Judicial Court.

Respectfully submitted,

JAMES F. BABCOCK,

Inspector of Milk and Vinegar.

BOSTON, December 31, 1885.

APPENDIX.

ORGANIZATION OF THE DEPARTMENT OF MILK INSPECTION FROM 1859 TO 1885.

Inspectors of Milk.

Henry Faxon, 1859–1879.
Martin Griffin, 1879–1884.
Bennet F. Davenport, M.D., 1884.
James F. Babcock, 1885.

Chemists employed by the Department.

Dr. A. A. Hayes, 1859.
Dr. Charles T. Carney, 1859–1862.
Dr. James C. White, 1862–1869.
Prof. James F. Babcock, 1869–1873.
Prof. John M. Merrick, 1873–1879.
Prof. Chas. E. Avery, 1879–1880.
Prof. James F. Babcock, 1879–1884.

Assistants in the Laboratory, 1884.

James O. Jordan.
Henry Ehrlich.
C. H. Preston.

ORGANIZATION OF THE DEPARTMENT OF THE INSPECTION OF MILK, BUTTER, AND VINEGAR FOR THE YEAR 1885–86.

Inspector of Milk, Butter, and Vinegar.

James F. Babcock.

Clerk.

William W. Griffin.

Assistant in Laboratory.

James O. Jordan.

Collectors of Samples.

John Killeen.
John T. Mullen.

THE LAWS OF MASSACHUSETTS

IN RELATION TO THE

SALE AND INSPECTION OF MILK.

[Chapter 57, Public Statutes.]

Section 1. The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of milk for their respective places, who shall be sworn before entering upon the duties of their office. Each inspector shall publish a notice of his appointment for two weeks in a newspaper published in his city or town, or, if no newspaper is published therein, he shall post up such notice in two or more public places in such city or town.

Sect. 2. (*As amended by Chapter 352, Acts of 1885.*) Such inspectors shall keep an office, and shall record in books kept for the purpose the names and places of business of all persons engaged in the sale of milk within their city or town. Said inspectors or their assistants may enter all places where milk is stored or kept for sale, and all carriages used for the conveyance of milk, and the said inspectors or their assistants may take samples for analysis from all such places or carriages. The inspectors shall cause the samples of milk so taken to be analyzed or otherwise satisfactorily tested, the results of which analysis or test they shall record and preserve as evidence. The inspectors shall receive such compensation as the mayor and aldermen or selectmen may determine.

Sect. 3. In all cities and in all towns in which there is an inspector of milk, every person who conveys milk in carriages, or otherwise, for the purpose of selling the same in such city or town, shall annually, on the first day of May, or within thirty days thereafter, be licensed by the inspector or inspectors of milk of such city or town to sell milk within the limits thereof, and shall pay to such inspector or inspectors fifty cents each to the use of the city or town. The inspector or inspectors shall pay over monthly to the treasurer of such city or town all sums collected by him or them. Licenses shall be issued only in the names of the owners of carriages or other vehicles, and shall, for the purposes of this chapter, be conclusive evidence of ownership. No license shall be sold, assigned, or transferred. Each license shall record the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person, engaged in carrying or selling said milk, and the number of the license. Each licensee shall, before engaging in the sale of milk

cause his name, the number of his license, and his place of business to be legibly placed on each outer side of all carriages or vehicles used by him in the conveyance and sale of milk, and he shall report to the inspector or inspectors any change of driver or other person employed by him which may occur during the term of his license. Whoever, without being first licensed under the provisions of this section, sells milk or exposes it for sale from carriages or other vehicles, or has it in his custody or possession with intent so to sell, and whoever violates any of the provisions of this section, shall, for a first offence, be punished by fine of not less than thirty nor more than one hundred dollars; for a second offence, by fine of not less than fifty nor more than three hundred dollars; and for a subsequent offence by fine of fifty dollars and by imprisonment in the house of correction for not less than thirty nor more than sixty days.

SECT. 4. Every person before selling milk or offering it for sale in a store, booth, stand, or market-place in a city or in a town in which an inspector or inspectors of milk are appointed, shall register in the books of such inspector or inspectors, and shall pay to him or them fifty cents to the use of such city or town; and whoever neglects to so register shall be punished for each offence by fine not exceeding twenty dollars.

SECT. 5. Whoever, by himself or by his servant or agent, or as the servant or agent of any other person, sells, exchanges or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, or milk produced from cows fed on the refuse of distilleries, or from sick or diseased cows, shall, for a first offence, be punished by fine of not less than fifty nor more than two hundred dollars; for a second offence, by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment in the house of correction for not less than thirty nor more than sixty days, and, for a subsequent offence, by fine of fifty dollars and by imprisonment in the house of correction for not less than sixty nor more than ninety days.

SECT. 6. Whoever, by himself or by his servant or agent, or as the servant or agent of any other person, sells, exchanges, or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale as pure milk, any milk from which the cream or a part thereof has been removed, shall be punished by the penalties provided in the preceding section.

SECT. 7. (*As amended by Chapter 352, Acts of 1885.*) No dealer in milk and no servant or agent of such a dealer, shall sell, exchange, or deliver, or have in his custody or possession with intent to sell, exchange, or deliver milk from which the cream or any part thereof has been removed, unless in a conspicuous place above the centre upon the outside of every vessel, can, or package from or in which such milk is sold the words "**SKIMMED MILK**" are distinctly marked in uncondensed Gothic letters not less than one inch in length. Whoever violates the provisions of this section shall be punished by the penalties provided in section five.

SECT. 8. (*As amended by Chap. 310, Acts of 1884.*) Any inspector of milk, and any servant or agent of an inspector who wilfully connives at or assists in a violation of the provisions of this chapter, and whoever hinders, obstructs, or in any way interferes with any inspector of milk, or any servant or agent of an inspector, in the performance of his duty, shall be punished by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment for not less than thirty nor more than sixty days.

SECT. 9. (*As amended by Chap. 352, Acts of 1885.*) In all prosecutions under this chapter, if the milk is shown upon analysis to contain more than eighty-seven per cent. of watery fluid, or to contain less than thirteen per cent. of milk solids, or to contain less than nine and three-tenths per cent. of milk solids, exclusive of fat, it shall be deemed for the purposes of this chapter to be adulterated.

SECT. 10. It shall be the duty of every inspector to institute a complaint for a violation of any of the provisions of this chapter on the information of any person who lays before him satisfactory evidence by which to sustain such complaint.

SECT. 11. Each inspector shall cause the name and place of business of every person convicted of selling adulterated milk or of having the same in his possession with intent to sell, to be published in two newspapers in the county in which the offence was committed.

SECT. 12. (*Section 8 of Chapter 352, of the Acts of 1885.*) No person shall sell, exchange, or deliver, or have in his custody or possession with intent to sell, exchange, or deliver, skimmed milk containing less than nine and three-tenths per cent. of milk solids, exclusive of fat. Whoever violates the provisions of this section shall be punished by the penalties provided in section five of chapter fifty-seven of the Public Statutes.

SECT. 13. (*Section 4 of Chapter 310, Acts of 1884.*) Before commencing the analysis of any sample the person making the same shall reserve a portion, which shall be sealed; and, in case of a complaint against any person, the reserved portion of the sample alleged to be adulterated shall, upon application, be delivered to the defendant or his attorney.

THE LAWS OF MASSACHUSETTS

IN RELATION TO THE

SALE AND INSPECTION OF BUTTER, OLEOMARGARINE, CHEESE, ETC.

[SECTIONS 17, 18, 19, 20, AND 21 OF CHAP. 56 OF THE PUBLIC STATUTES, AS AMEMDED BY CHAP. 310 OF THE ACTS OF 1884, AND CHAP. 352, ACTS OF 1885.]

SECT. 17. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance, or compound, made in imitation or semblance of butter or as a substitute for butter, and not made exclusively and wholly of milk or cream, or containing any fats, oils, or grease not produced from milk or cream, shall have the words "**IMITATION BUTTER,**" or if such substitute is the compound known as "**OLEOMARGARINE,**" then the word "**OLEOMARGARINE,**" or, if it is known as "**BUTTERINE,**" then the word "**BUTTERINE,**" stamped, labelled, or marked, in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length, so that said words cannot be easily defaced, upon the top and side of every tub, firkin, box, or package containing any of said article, substance, or compound. And in cases of retail sales of any of said article, substance, or compound not in the original packages, the seller shall, by himself or his agents, attach to each package so sold, and shall deliver therewith to the purchaser, a label or wrapper bearing in a conspicuous place upon the outside of the package the words "**IMITATION BUTTER,**" "**OLEOMARGARINE,**" or "**BUTTERINE,**" as the article may be, in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length.

SECT. 18. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance, or compound made in imitation or semblance of cheese or as a substitute for cheese, and not made exclusively and wholly of milk or cream, or containing any fats, oils, or grease not produced from milk or cream, shall have the words "**IMITATION CHEESE**" stamped, labelled, or marked, in printed letters of plain, uncondensed Gothic type, not less than one inch in length, so that said words cannot be easily defaced, upon the side of every cheese-cloth or band around the same, and upon the top and side of every tub, firkin, box, or package containing any of said article, substance, or compound. And in cases of retail sales of any of said article, substance, or compound not in the original packages,

the seller shall, by himself or his agents, attach to each package so sold, and shall deliver therewith to the purchaser, a label or wrapper bearing in a conspicuous place upon the outside of the package the words "**IMITATION CHEESE,**" in printed letters of plain, uncondensed Gothic type, not less than one inch in length.

SECT. 19. Whoever sells, exposes for sale, or has in his possession with intent to sell, any article, substance, or compound made in imitation or semblance of butter or cheese, or as a substitute for butter or cheese, except as provided in the two preceding sections, and whoever defaces, erases, cancels, or removes any mark, stamp, brand, label, or wrapper provided for in said sections, or changes the contents of or in any manner shall falsely label, stamp, or mark any box, tub, article, or package marked, stamped, or labelled as aforesaid, with intent to deceive as to the contents of said box, tub, article, or package, shall for every such offence forfeit to the city or town where the offence was committed one hundred dollars, and for a second and each subsequent offence two hundred dollars.

SECT. 20. Inspectors of milk shall institute complaints for violations of the provisions of the three preceding sections when they have reasonable cause to believe that such provisions have been violated, and on the information of any person who lays before them satisfactory evidence by which to sustain such complaint. Said inspectors may enter all places where butter or cheese is stored or kept for sale, and said inspectors shall also take specimens of suspected butter or cheese and cause them to be analyzed or otherwise satisfactorily tested, the result of which analysis or test they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admitted in evidence in all prosecutions under this and three preceding sections. The expense of such analysis or test, not exceeding twenty dollars in any one case, may be included in the costs of such prosecutions. Whoever hinders, obstructs, or in any way interferes with any inspector, or any agent of an inspector, in the performance of his duty, shall be punished by a fine of fifty dollars for the first offence, and of one hundred dollars for each subsequent offence.

SECT. 21. For the purposes of the four preceding sections, the terms "butter" and "cheese" shall mean the products which are usually known by these names, and are manufactured exclusively from milk or cream, with salt and rennet, and with or without coloring matter.

LAWS OF MASSACHUSETTS

IN RELATION TO THE

SALE AND INSPECTION OF VINEGAR.

[CHAPTER 60, SECTION 69, AS AMENDED BY CHAPTER 257, ACTS OF 1883.]

SECT. 69. — Every person who manufactures for sale, or offers or exposes for sale as cider vinegar, any vinegar not the legitimate product of pure apple-juice, known as apple-cider, or vinegar not made exclusively of said apple-cider, or vinegar into which foreign substances, drugs, or acids have been introduced, as may appear by proper tests, shall for each offence be punishable by fine of not less than fifty, nor more than one hundred, dollars.

SECT. 70. — Every person who manufactures for sale, or offers for sale, any vinegar found upon proper tests to contain any preparation of lead, copper, sulphuric acid, or other ingredient injurious to health, shall for each such offence be punished by fine of not less than one hundred dollars.

SECT. 71. — The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of vinegar, who shall be sworn before entering upon their duties.

[CHAPTER 307, ACTS OF 1884, AS AMENDED BY CHAPTER 150, ACTS OF 1885.]

SECTION 1. — No person shall by himself, his servant, or agent, or as the servant or agent of any other person, sell, exchange, deliver, or have in his custody or possession with intent to sell or exchange, or expose or offer for sale or exchange any adulterated vinegar, or label, brand, or sell as cider vinegar, or as apple vinegar, any vinegar not the legitimate product of pure apple-juice, or not made exclusively from apple-cider.

SECT. 2. — All vinegars shall be without artificial coloring matter, and shall have an acidity equivalent to the presence of not less than four and one-half per cent. by weight of absolute acetic acid, and in the case of cider vinegar shall contain in addition not less than two per cent. by weight of cider vinegar solids upon full evaporation over boiling water; and if any vinegar contains any artificial coloring matter or less than the above amount of acidity, or, in the case of cider vinegar, if it contains less than the above amount of acidity or of cider vinegar solids, it shall be deemed to be adulterated within the meaning of this act.

SECT. 4. — Whoever violates any of the provisions of this act shall be punished by fine not exceeding one hundred dollars.

DECISIONS OF THE SUPREME JUDICIAL COURT OF MASSACHUSETTS IN RELATION TO THE LAWS RELATIVE TO THE SALE AND INSPECTION OF MILK.

[*Massachusetts Reports, Vol. 132—p. 11—1882.*]

Commonwealth *v.* Martin E. Evans.

Suffolk, June 27, 1881 — Jan. 4, 1882, Endicott and Allen, J.J., absent.

A person may be convicted of selling adulterated milk upon a complaint under the St. of 1880, c. 209, § 3, without allegation or proof that he knew it to be adulterated.

The St. of 1880, c. 209, § 7, providing that "in all prosecutions under this act," for selling adulterated milk, "if the milk shall be shown upon chemical analysis to contain more than eighty-seven per centum of watery fluid, or to contain less than thirteen per centum of milk solids, it shall be deemed for the purposes of this act to be adulterated," is constitutional.

Morton, J. This is a complaint under the Statute of 1880, Chapter 209. It alleges that the defendant did "unlawfully sell to one Patrick Scannell, of Boston, for the sum of thirty-five cents, a quantity, that is to say eight quarts, of adulterated milk, that is to say a certain quantity, to wit, six quarts and one pint, of milk, to which a certain quantity, that is to say three pints, of water, had been added." The second count charges possession, with intent to sell, milk adulterated in the same manner.

At the trial the defendant asked the Court to rule that the Government was bound to allege and prove that the defendant had knowledge that the milk was adulterated. The Court rightfully refused this ruling. This has been directly adjudicated in this Commonwealth.

Commonwealth *v.* Farren, 9 Allen, 489.
Commonwealth *v.* Nichols, 10 Allen, 199.
Commonwealth *v.* Winter, 11 Allen, 264.

The defendant asked the Court to rule that the seventh section of chapter 209 of the Statute of 1880 is unconstitutional.

This section provides that "in all prosecutions under this act, if the milk shall be shown upon analysis to contain more than eighty-seven per centum of watery fluid, or to contain less than thirteen per centum of milk solids, it shall be deemed to be adulterated."

The intention of the Legislature, and the practical operation of this section, in connection with the third section, is to provide that it shall be unlawful to sell milk containing less than thirteen per centum of milk solids.

This belongs to the class of police regulations designed to prevent frauds and to protect the health of the people, which it was within the constitutional power of the Legislature to enact.

Bancroft *v.* Cambridge, 126 Mass., 438, and cases cited.

We have difficulty in seeing, as the case is presented to us in this bill of exceptions, that this question was mentioned or prop-

erly involved in the case; the complaint being, not under the seventh section, but under the third section, for selling milk to which water had been added.

Commonwealth *v.* Luscomb, 130 Mass., 42.

But as this question seems to have been distinctly raised and ruled upon at the trial, it has been considered.

Exceptions overruled.

[*Massachusetts Reports, Vol. 132—p. 14—1882.*]

COMMONWEALTH *v.* JOHN C. CARTER.

Suffolk, Nov. 21, 1881—Jan. 4, 1882, MORTON, ENDICOTT, and ALLEN, J.J., absent.

The St. of 1864, c. 122, § 2, so far as it authorizes inspectors of milk to enter all carriages used in the conveyance of milk, and whenever they have reason to believe any milk found therein is adulterated, to take specimens thereof for the purpose of analyzing or otherwise satisfactorily testing the same, is constitutional.

FIELD, J. The only question argued in this case is the constitutionality of Section 2, Chapter 122, Statute of 1864, so far as it authorizes inspectors of milk to "enter any place where milk is stored or kept for sale, and all carriages used in the conveyance of milk; and whenever they have reason to believe any milk found therein is adulterated, they shall take specimens thereof and cause the same to be analyzed or otherwise satisfactorily tested, the result of which they shall record and preserve as evidence."

It is contended that this provision is unconstitutional, because it authorizes the taking of property without consent or compensation; warrants unreasonable searches and seizures; compels one to furnish evidence against himself; and is not within the police-power of the Commonwealth.

An analysis of a specimen of milk offered for sale is an appropriate means of carrying into effect the various provisions of the statutes regulating the sale of milk in this Commonwealth. In the case at bar the can of milk was taken from a carriage used in the conveyance of milk, and it is unnecessary to consider whether the words of the section "place where milk is stored or kept for sale," may or may not include a dwelling-house, and whether, if construed to include dwelling-house they do not purport to give a power which the Legislature could not give, because the clause authorizing an entry into any place where milk is stored or kept for sale is separable from that which authorizes an entry into all carriages used in the conveyance of milk. Neither is the power granted in violation of the following provision of Art. XII. of the Declaration of Rights, viz.: "No subject shall . . . be compelled to accuse, or furnish evidence against himself." If the seizure is such as is authorized by the Constitution, and a law passed in pursuance thereof, the fact that the thing seized may be used in evidence in a criminal charge against the person from whose possession it is taken, does not render the seizure itself a violation of the Declaration of Rights.

Commonwealth *v.* Dana, 2 Met., 329, 337.

If the statute had required that all milk offered for sale should first be inspected, it would hardly be contended that the trifling injury to property occasioned by taking samples for inspection would be such a taking of private property for public use as to require that compensation be made therefor. Such an injury to property is a necessary incident to the enforcement of reasonable regulations affecting trade in food. Private property is held subject to the exercise of such public rights for the common benefit, and in the case of licensed dealers in merchandise the injury suffered by inspection is accompanied by advantages which must be regarded as sufficient compensation.

Bancroft *v.* Cambridge, 126 Mass., 438, 441.

Instead of requiring all milk offered for sale to be first inspected the Legislature, for obvious reasons, have permitted licensed dealers to sell milk without inspection; have imposed penalties for selling adulterated milk; have defined what shall be deemed adulterated milk; and have provided that when the inspector of milk has reason to believe that any milk has been adulterated, he may take specimens thereof, in order that, by analysis, or otherwise, he may determine whether the milk has been adulterated. Such a seizure of milk for the purpose of examination is a reasonable method of inspection, and does not require a warrant. It is a supervision, under the laws, by a public officer, of a trade which concerns the public health, and is within the police power of the Commonwealth.

Commonwealth *v.* Ducey, 126 Mass., 269.
Jones *v.* Root, 6 Gray, 435.

There is nothing in this case which requires us to determine the rights of the defendant, if the inspector had attempted to take a larger quantity of milk for inspection than was reasonably necessary for the performance of his duties. We have not found it necessary to consider whether the defendant, by voluntarily accepting a license to sell milk, has not assented to the conditions and regulations which the Legislature has seen fit to impose upon the exercise of the trade licensed.

Pitkins *v.* Springfield, 112 Mass., 509.
Berthoff *v.* O'Reilly, 74 N.Y., 509, 517.

Exceptions overruled.

(*Massachusetts Reports — Vol. 139.*)

Commonwealth *v.* John Keenan.

Suffolk, Feb. 5, — March 2, 1885. Devens, W. Allen, and Colburn, J.J., absent.

A complaint under the Pub. Sts. Chap. 57, Sect. 5, 9, alleging that the defendant, at a time and place named, had in his custody and possession a certain quantity, to wit, one pint, of adulterated milk, to wit, milk then and there containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient.

Complaint to the Municipal Court of the city of Boston, under the Pub. Sts. Chap. 57, Sect. 5, alleging that the defendant, at a time and place named, did have in his "custody and possession a certain quantity, to wit, one pint, of adulterated milk, to wit, milk then and there containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same."

In the Municipal Court, the defendant seasonably filed a motion to quash the complaint, assigning the following grounds therefor: —

"1. It does not appear, in and by said complaint, in what manner, and by what means, said milk was adulterated.

"2. It does not allege in which one of the three methods of adulteration mentioned in the Pub. Sts., c. 57, Sect. 5, the milk was adulterated.

"3. Because the charge is set forth in such vague, uncertain, and general terms as to afford the defendant no proper information as to the exact nature of the offence with which he is charged."

The motion was overruled, and the defendant was adjudged guilty.

In the Superior Court, on appeal, the defendant renewed his motion to quash. Blodgett, J., overruled the motion.

The defendant was then tried, and found guilty; and alleged exceptions.

MORTON, C. J. The statute provides that no person shall sell, or have in his possession with intent to sell, "adulterated milk, or milk to which water or any foreign substance has been added, or milk produced from cows fed on the refuse of distilleries, or from sick or diseased cows."

Pub. Sts., Chap. 57, Sect. 5.

Sect. 9 provides that, "in all prosecutions under this chapter, if the milk is shown, upon analysis, to contain more than eighty-seven per cent. of watery fluid, or to contain less than thirteen per cent. of milk solids, it shall be deemed, for the purposes of this chapter, to be adulterated."

The word "or" in section 5 is not used in the sense of "to wit," as contended by the defendant, but the section describes several offences, its purpose being to prohibit the sale of impure milk and of milk of an inferior quality. This was recognized in Commonwealth *v.* Luscomb, 130 Mass., 42, where the allegation of the indictment was, that the defendant had in his possession, with intent to sell, "adulterated milk, to which milk water had been added." It was held that the words "to which milk water had been added" were descriptive of the offence charged, and must be proved, and that it was erroneous to rule that under this allegation the defendant could be convicted if the milk was as it naturally came from the cow, because it contained less than thirteen per cent. of milk solids.

As was said in Commonwealth *v.* Evans, 132 Mass., 11, the intention of the Legislature and the practical operation of the two sections we have cited are to provide that it shall be unlawful to

sell milk which from any cause contains less than thirteen per cent. of milk solids.

This is the offence charged in the case at the bar. The statute sets out all the elements of the offence; it is not necessary for the Government to allege or prove the cause which reduced the quality of the milk below the legal standard, and the complaint, being substantially in the words of the statute, is sufficient.

The defendant's motion to quash was therefore rightly overruled.

Exceptions overruled.

COMMONWEALTH *v.* HARRISON G. O. BOWERS.

FIELD, J. The complaint is in form like that which now held sufficient in Commonwealth *v.* Keenan 139 Mass., 193.

The offence charged consists in defendant having in his possession, with intent to sell, milk which contained less than thirteen per cent. of milk solids. That this fact is shown by analysis is a matter of proof, but it is not a constituent element of the offence that there was an analysis, and it need not be alleged in the complaint.

The motion to quash was rightly overruled.

It is immaterial in what manner the quantity of milk solids had been reduced below the per centum, if the intent is to sell the milk as pure milk, and not as skimmed milk.

Pub. Stat. Chap. 57, Sects. 6, 8, 9.

The instructions requested were rightly refused.

Exceptions overruled.

INDEX.

Adulterations of Milk 24
Analyses of Butter 41
" " Milk 32
" " Oleomargarine 41
" " Vinegar 42
Analysis of Milk for determination of the ash 20
" " " " " " " fat 20
" " " " " " " milk solids 19
" " " " " " " solids not fat 20
" " " " " " " milk sugar 20
Annatto, detection of 29
Average composition of milk 31
Boracic acid in milk 29
Butter, analyses of 41
" laws in relation to 51
" imitation 40
" method of examination of 40
Cheese, laws in relation to 51
City laboratory 14
Colored milk 28
Complaints 4
Cream, removal of 26
Decisions of the Supreme Court in relation to milk 54
Diseases communicated by milk 25
Duties of the inspector 3
Expenses of the office 8
Income of the office 9
Inspections 4
Lactometers 18
Lactoscope, Feser's 18
Laws of Massachusetts in relation to butter, cheese, milk and vinegar 48
Licenses 3
Milk, adulterations of 24
" analyses of 32
" average composition of 31
" boracic acid in 29
" colored 28
" diseases communicated by 24
" decisions of Supreme Court in relation to 54
" laws in relation to 51
" preservatives 29
" salicylic acid in 29
" specific gravity of 15
" standard of 30
" water in 24
Methods of inspection 15
Note-book for milk analyses 21
Oleomargarine, analyses of samples 41
" detection of 40
" laws in relation to 51
Organization of the department 47
Preservatives in milk 29
Removal of cream 26

Results of inspection 9
Salicylic acid in milk 29
Skimmed milk 26
Specific gravity of milk 15
Standard of milk 30
Statistics 6
Supreme Court decisions 54
Comm. *v.* Evans 54
" " Carter 55
" " Keenan 56
" " Bowers 58
Tables of corrections for specific gravity 16
Tables showing percentage of added water in adulterated milk 23
Vinegar 42
" analyses of 43
" laws in relation to 53
Water, dangers of, in milk 24

TWENTY-EIGHTH ANNUAL REPORT

OF THE

Inspector of Milk and Vinegar

FOR THE YEAR 1886.



BOSTON:
ROCKWELL AND CHURCHILL, CITY PRINTERS,
No. 39 ARCH STREET.
1887.

[Document 23 — 1887.]

CITY OF BOSTON.

TWENTY-EIGHTH ANNUAL REPORT

OF THE

INSPECTOR OF MILK AND VINEGAR.

FROM JAN. 1, 1886, TO DEC. 31, 1886.

Office of the Inspector of Milk and Vinegar,
1151 Washington Street.

To His Honor the Mayor and Board of Aldermen of the City of Boston: —

During the year which closes — the twenty-eighth since the establishment of milk-inspection in the city of Boston — the work of this department has been steadily pursued, with the result of still further reducing both the number of adulterated samples and the extent of the adulteration in those samples which were found to be below the standard.

In the year 1884, and the early part of the year 1885, the percentage of adulterated samples, from all sources (stores and wagons), was 40 per cent.

Considering that these samples were, on the average, reduced in value 25 per cent., either by the addition of water or the removal of cream, and bearing in mind that 66,000,000 quarts of milk are annually sold in Boston, it is easy to calculate that, at an average price of six cents per quart, there were paid by the citizens of Boston no less than $396,000 for which they received no equivalent. During the year 1886 the percentage of adulterated samples has been reduced to 18.55 per cent., or less than one-half that found to be the case in 1884, so that it may be fairly claimed that this

department has saved to the citizens of Boston about $200,000 in the value of the milk which they are now receiving, as compared with that sold in 1884.

A summary of the work of this department is herewith respectfully submitted: —

The general duties of the office, as defined by statute, relate to licenses, inspections, and complaints.

Licenses.

The Inspector is required to annually, on the first day of May, or within thirty days thereafter, license all persons who convey milk in carriages or otherwise for the purpose of selling the same within the city, the license-fee being fifty cents.

To keep a record of the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person engaged in carrying or selling milk, and the number of the license.

To see that the owner's name, number of his license, and place of business are legibly placed on each outer side of all carriages or vehicles used in the conveyance and sale of milk.

To register the name of every person selling or offering milk for sale in a "store, booth, stand, or market-place" within the city; the registration-fee, fifty cents, not being required to be renewed annually.

To annually, on the first day of May, or within thirty days thereafter, license all persons who convey imitation butter, oleomargarine, or butterine, in carriages or otherwise, for the purpose of selling the same within the city, the license-fee being fifty cents.

To keep a record of the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person engaged in carrying or selling imitation butter, oleomargarine, or butterine, and the number of the license.

To see that the owner's name, number of his license, and place of business are legibly placed on each outer side of all carriages or vehicles used in the conveyance and sale of imitation butter, oleomargarine, or butterine.

To register the name of every person selling or offering imitation butter, oleomargarine, or butterine, for sale in a "store, booth, stand, or market-place" within the city; the registration-fee, fifty cents. This license is required to be renewed annually.

MILK LICENSES.

	1885.	1886.
Number of yearly licenses issued to dealers conveying milk from place to place, by carriages or otherwise	681	664
Number of yearly registrations of drivers employed in carrying or selling milk	496	529
Number of licenses issued to store-keepers not previously registered	202	382
Number of registrations of store-keepers to date	2,577	2,959
Total number of milk-licenses issued	883	1,046
Notices sent to persons not having their wagons properly marked with name, license number, and place of business	15	53

BUTTERINE LICENSES.

Number of yearly licenses issued to dealers conveying butterine, etc., from place to place by carriages or otherwise	92
Number of yearly registrations of drivers employed in carrying or selling butterine, etc.	42
Number of licenses issued to store-keepers	491
Total number of butterine licenses issued	583
Total number of licenses (milk and butterine) issued	1,629

	1885.	1886.
Fees received for the same and paid to the City Collector	$441 50	$814 50

INSPECTIONS.

It is the duty of the Inspector to enter all places where *milk* is stored or kept for sale, and to take samples, which he shall cause to be analyzed or otherwise satisfactorily tested.

To take samples of *butter*, *oleomargarine*, and *cheese*, for the same purpose.

To examine samples of *vinegar*, for strength, purity, and freedom from deleterious substances.

Number of milk inspections	8,701
Number of oleomargarine and butter inspections	4,382
Number of vinegar inspections	873
Total number of inspections	13,956

Number of warnings issued to store-keepers: —	
For milk not of standard quality	1,048
For oleomargarine not properly marked . .	269
For vinegar not of standard quality . . .	283
Total number of warnings . . .	1,600

COMPLAINTS.

The statutes provide penalties: —

For neglecting or refusing to license or register for the sale of milk.

For selling, or exposing for sale, adulterated milk, or milk not of standard quality, or milk to which water or any foreign substance has been added, or milk produced from sick or diseased cows, or milk produced from cows fed on the refuse of distilleries.

For selling, or offering for sale as pure milk, milk from which the whole or any part of the cream has been removed.

For selling skimmed milk, unless from cans or other vessels marked as required by statute.

For selling, or exposure for sale, or possession with intent to sell, milk or skimmed milk which is not of standard quality, *i.e.*, containing less than thirteen per cent. of milk solids in the case of whole milk, or less than nine and three-tenths per cent. of milk solids, exclusive of fat, in the case of skimmed milk.

For obstructing in any manner, the Milk Inspector or his assistants in the performance of their duties.

For neglecting or refusing to license or register for the sale of butterine, etc.

For selling, or exposure for sale, or possession with intent to sell, oleomargarine, butterine, imitation butter, or imitation cheese, unless marked as required by statute.

For the sale, or exposure for sale, as cider vinegar, vinegar which is not made exclusively of apple cider.

For the sale, or exposure for sale, of vinegar containing any artificial coloring matter, or containing any preparation of lead, copper, sulphuric acid, or any ingredient injurious to health.

For the sale of any vinegar not of standard quality, *i.e.*, containing less than four and one-half per cent. of absolute acetic acid, or, in the case of cider vinegar, containing less than two per cent. by weight of cider-vinegar solids.

It is the duty of the Inspector to make complaint for any of the offences thus enumerated, which may be brought to his

notice as the result of his analyses of samples, or on the information of any person who lays before him satisfactory evidence upon which to sustain such complaint.

Municipal Courts.

Number of complaints	98
Boston	49
South Boston District	14
Roxbury District	17
Charlestown District	14
East Boston District	4
Number of convictions	62
Number of complaints dismissed	13
Number of complaints in which warrants were returned "without service"	5
Number of complaints placed on file, on payment of costs	2
Number of complaints pending	3
Number of complaints quashed	13
Of the sixty-two cases convicted in the Municipal Courts, there were settled in lower court	30
Appealed	32

Superior Court.

Number of cases	33
Appealed	32
Indicted by Grand Jury	1
Number of convictions	18
Number of complaints placed on file, on payment of costs	7
Number of complaints dismissed	1
Number of complaints *nol. pros'd*	3
Number of complaints pending	4

Supreme Court.

Number of cases carried up on exceptions	3
Number of cases (of 1886) waiting decision	3

Of the ninety-eight cases brought during the year, the number for each of the following were: —

Milk	88
Oleomargarine	9
Vinegar	1

Old Cases of 1885 Settled during the Year.

At the time of the last report there were pending thirty-one cases.

There have been settled as follows: —

Number of convictions	20
Number placed on file	10
Number *nol. pros'd*	1

Of the three cases carried to the Supreme Court on exceptions, during 1885, the exceptions were waived by the defendants in two of the cases, and the exceptions sustained in the other case.

The total number of cases attended to during the year 1886 is as follows: —

Municipal Courts	98
Superior Court	33
Municipal Courts (old cases)	2
Superior Court (old cases)	29
Total	162

For violations of the statutes relating to milk and oleomargarine there has been paid in fines the sum of $3,700.

STATISTICS.

Number of milk routes in the city of Boston	664
Routes of 1 to 5 cans	178
Routes of 5 to 10 cans	84
Routes of 10 to 25 cans	117
Routes of 25 to 50 cans	177
Routes of 50 to 100 cans	78
Routes of 100 to 200 cans	17
Routes of 200 cans	7
Routes exceeding 200 cans	6
Number of drivers employed	529
Number of wagons employed	592
Number of stores where milk is sold	2,128
Approximate number of persons engaged in the sale of milk	3,350
Number of cows kept within the city limits, whose milk is sold	1619
Approximate number of cows required to furnish the daily supply of milk	25,000

Estimated number of quarts for average daily supply of milk to the city of Boston	180,565
Estimated number of quarts for yearly supply,	65,906,225
Estimated annual consumption *per capita*	42 gallons.
Esimated daily cost to consumers	$10,834
Estimated annual cost to consumers	$3,954,373
Estimated annual cost *per capita*	$10
Annual cost *per capita* for inspection in the city of Boston	2 cents

Quantity of Milk daily supplied to City of Boston, as per Inspector's Reports, from 1862 to 1886: —

1862	15,000 gallons.
1863	16,000 "
1864	16,595 "
1865	15,733 "
1866	16,129 "
1867	17,125 "
1868	17,493 "
1869	19,686 "
1870	20,948 "
1871	23,316 "
1872	24,009 "
1873	25,282 "
1874	26,329 "
1875	34,578 "
1876	34,670 "
1877	30,388 "
1878	27,400 "
1879	28,256 "
1880	29,000 "
1881	33,084 "
1882	33,084 "
1883	35,646 "
1884	36,000 "
1885	44,708 "
1886	45,140 "

The above figures represent the quantities of milk (some of which had been reduced by water) supplied to consumers, so that, while the figures show but a slight difference between the year 1885 and the year 1886, there has been sold by contractors probably ten per cent. more milk in 1885 than in 1886, in consequence of the demand of milk-peddlers for milk to supply the place of water formerly used.

EXPENSES

From January 1, 1886, to December 31, 1886.

For salaries of Inspector, clerk, laboratory assistant, and two collectors of samples		$7,092 33
For printing		279 40
For apparatus, glassware, and laboratory supplies		425 47
For chemicals for laboratory		65 67
For advertising		120 25
For telephone service		94 66
For postage		70 00
For stationery		69 43
For incidental expenses, viz.: —		
Carriage-hire	$138 25	
Seals, stamps, etc.	71 20	
Samples purchased, and expenses of collectors	220 53	
		429 98
		$8,647 19
Amount of appropriation		$9,000 00

INCOME

From January 1, 1886, to December 31, 1886.

From milk licenses	$523 00
From butterine licenses	291 50
From fines as the result of prosecutions	3,700 00
Total	$4,514 50

RESULTS OF INSPECTION.

The inspection of milk during the year 1886 has effected a very decided improvement in the character of the article supplied both by stores and peddlers.

Percentage of adulterated samples of Milk obtained from stores for corresponding periods of 1885 and 1886.

	1885.	1886.
July	61.42 per cent.	39.90 per cent.
August	61.54 "	26.64 "
September	62.08 "	23.27 "
October	33.68 "	14.83 "
November	38.14 "	10.92 "
December	24.63 "	11.08 "

The total percentage of poor samples of milk from both stores and teams for 1884 was 40.00 per cent.
" 1885 " 30.64 "
" 1886 " 18.55 "

Percentage of poor samples of milk for the entire year 1886 : —

Stores	22.82 per cent.
Teams	11.55 "

The inspection of oleomargarine, butterine, etc., has shown still more favorable results ; for, out of a total of 4,194 inspections made during the year, warnings were required in but 269 cases, or 6.13 per cent., *i.e.*, 93.87 per cent. of the dealers were found to be complying with all the provisions of the law.

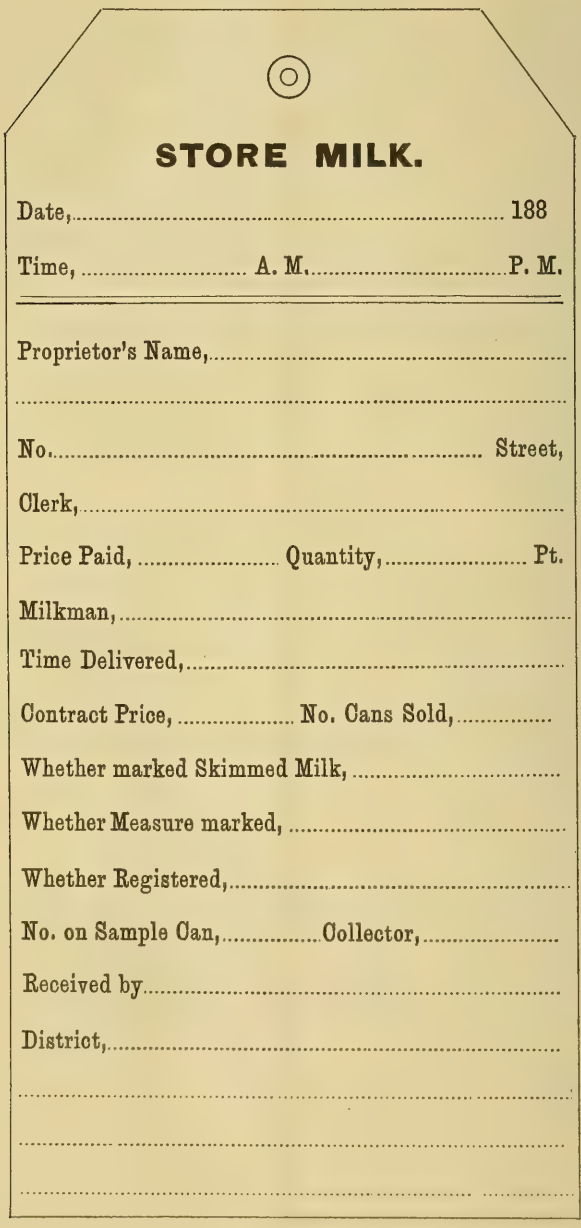
The number of adulterated samples of vinegar found during the year 1886 is also somewhat less than in 1885, being 32.52 per cent. in 1886, against 38.00 per cent. in 1885.

Methods of Inspection.

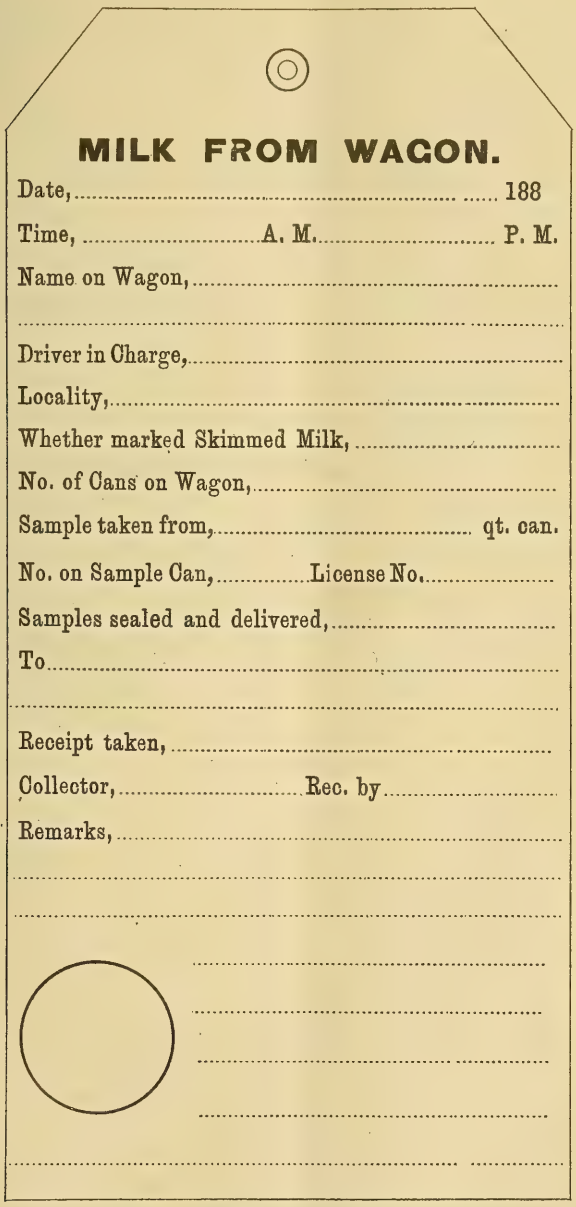
Information under this head being of use from year to year, a portion of the report for last year is here repeated.

The office at present employs two collectors of samples, whose duties begin at an early hour of the morning, and which are to take samples of milk from wagons and stores and deliver them to the office. The collectors make no inspection of the milk, but their duties consist wholly in the taking of samples, and the examination of wagons to see that the provisions of the statutes in relation to licenses are complied with. The collectors are each provided with a small hand-bag holding ten pint cans, each of them having a figure stamped upon the handle. A sample of milk being obtained (and the same system is applied to butter and vinegar), a printed tag is securely fastened to the can with a short piece of iron wire. The collector is required to write upon the tag the date, the hour, and the locality where the sample is obtained, with such other facts as may be necessary.

The following represents one of the cards used for the collection of milk from stores : —



The following represents one of the tags used for samples of milk obtained from wagons : —



The circle on the lower corner of the card is a space for the dairy mark.

The collector records the name upon the wagon, the driver in charge, and the license number. He carefully observes the can from which the sample is obtained, and reports whether or not the can is marked "Skimmed milk." Signing his name or initials, he deposits the can in the bag, and proceeds to take other samples, which he labels in a similar manner. The samples are delivered to the office, where they are received personally by the inspector or his assistant, who receipts for them by marking each card with the initial letter of his name. The samples are then analyzed, the results of the analysis being written upon the back of the card upon proper spaces prepared for recording the various results obtained. The card is not detached from the can until the examination is completed. The results are copied into books kept for the purpose, while the cards (being the original report of the whole inspection, from the first taking of the sample to its final analysis) are filed away in suitable drawers, arranged alphabetically according to the names of the milkmen. In this way is gradually accumulated a large number of reports, which form a complete card-catalogue (like those adopted in libraries), where at a glance can be found the entire record of any particular dealer for the year. The sample being satisfactory, the card takes its place in the card-catalogue. If unsatisfactory the card is stamped by the analysist with a **W** (warning) in the case of a store, or a **C** (complaint) in case the sample is taken from a wagon. If a store, the following warning-notice is sent: —

CITY OF BOSTON.

OFFICE OF INSPECTOR OF MILK, BUTTER AND VINEGAR,
1151 WASHINGTON STREET.

No. 2650

Boston, ... 188

You are hereby notified that a sample of milk recently obtained from you has been found on analysis to be of poorer quality than that required by the statutes. You are respectfully notified that the sale of such milk, or the possession or custody of the same, with intent to sell, renders you liable to the penalties provided by the Public Statutes.

Further information will be furnished you on personal application to this office.

Respectfully,

.....

Inspector.

To

.....

Under our statute a store-keeper is equally liable with a milkman for the possession or sale of adulterated milk, but it is thought best to send warnings, because, while there are doubtless some store-keepers who adulterate their milk, the larger number of them sell it as delivered to them. The effect of this notice is to cause the store-keeper to admonish the milkman, in many cases to discharge him, and in almost all instances to produce an immediate improvement of the milk sold.

After two or more warnings are thus sent to the same store-keeper, if the milk is found, within a reasonable time, to be below the standard, the proprietor of the store is complained of; this has been necessary, however, in but a few instances. These warnings are not sent to milkmen.

Methods of Examination.

The methods employed for the analysis of milk have been the same as those given in the report of 1885.

Previous to making the analysis all samples are examined as to their specific gravity, and the approximate percentage of fat as given by Feser's lactoscope.

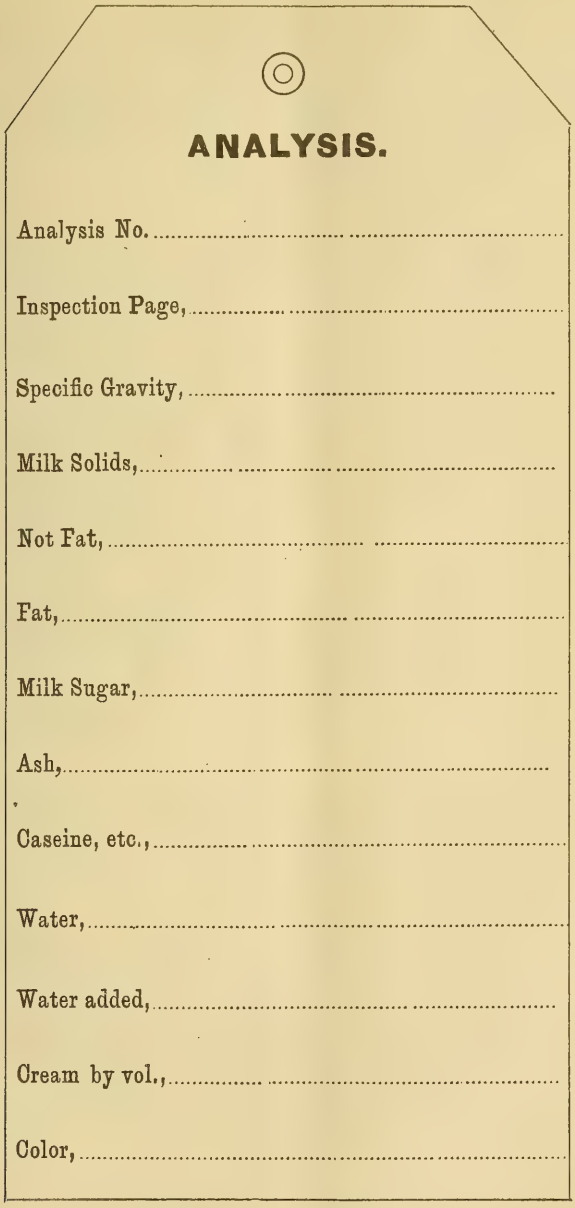
The specific gravity is determined by a delicate Pile's hydrometer, — correction being made for the temperature, and the specific gravity reduced to 15° C. (59° F.) The specific gravity being required at 59° F., a correction is necessary, because, if the milk be *colder* than 59°, the readings of the hydrometer and lactometer are too *high;* while, if the milk be *warmer* than 59°, the readings of these instruments are too *low.*

The readings of the lactoscope, taken in connection with the corrected specific gravity, make it possible to determine with very reasonable certainty whether the milk is very good or very poor; if found to be very good it is passed; if found to be poor or doubtful it is analyzed to ascertain its precise character and composition.

The percentage of *milk solids* is obtained by the evaporation of 5 grains of milk in a platinum vessel until it ceases to lose weight at a temperature of 212° F.

The weight of the dish and solids, after extraction of the fat with benzine of 75° to 80° Baumé, gives the *solids not fat;* the difference between this and the total solids, the *fat.* The *ash* is determined by ignition.

The reverse side of the tags used for milk samples are printed like the following: —



These cards are not removed from the cans containing the specimens to be examined until the analysis is finished and the results recorded upon the card.

COLORED MILK.

The most important step taken during the year in regard to milk adulteration has been the very successful attempt of this department to suppress the use of *color;* and, so far as is known, it is the first systematic effort which has been made in this direction by milk analysts in any country.

Every one knows that when milk is either skimmed or watered it appears blue; consequently, the dishonest milkman finds it necessary to conceal his fraud by coloring his milk by the use of some material which will restore the natural color. Soon it was found that milk thus colored was a great "improvement" upon the natural article, because it was thus made to appear rich; and as the color was used in but small quantities, and was not directly injurious, its use became almost universal. Many milk-dealers, whose milk was otherwise pure, did not hesitate to employ color, and did not deny its use, because it was necessary, as they claimed, "to please the customer." The milk-color at first used was a solution of burned honey, sugar, or molasses, called *caramel*, but later an alkaline solution of *annatto* was employed. Of the caramel three or four teaspoonfuls were required to color ten cans ($8\frac{1}{2}$ quarts each) of milk, and of the annatto solution about one teaspoonful to the same quantity.

The manufacture and sale of these articles was of sufficient importance to induce certain persons to make it their exclusive business.

The claims made for such material by the manufacturer of one of them may be seen from the following correspondence copied from the Sixth Annual Report of the Massachusetts State Board of Health (page 117):—

———, MASS., Oct. 25.

DEAR SIR: — I would like to call your attention to ———, for which I am the agent. It is the article which all milkmen in Boston and vicinity use to improve the quality of their milk, and to help them out when milk is scarce. It is perfectly harmless, and the milk inspectors and State Board of Health cannot detect it in the milk. The amount of water you can add to your milk in one day without detection will pay for ——— enough to use three months. If you have any friends in the business, please tell them of this. Yours truly, ——— ———.

———, MASS., Nov. 8, 1884.

DEAR SIR: — Yours received. Sent by Adams express one bottle ——— Give it a good trial. Don't be afraid of the color, taste or smell, as you will find it to be all right when in the milk. A sample of

milk taken from a batch put up with ——— and analyzed will prove to the inspector to be all right, as the ——— counteracts the chemicals they have to use in the analysis. Yours truly, ———————.

Directions also accompanied the above letter, in which, after specifying the amount of water, sugar, and salt to be used in addition to the coloring matter, the writer adds: "If you take cream off from the milk, add a trifle more. Some don't use sugar only when sticking their milk pretty hard. It gives it a good body, however."

At a trial in a neighboring city, a driver of a milk wagon, being upon the witness stand, made the following admission: "The boss said to me, 'If the customers kick, put in more honey-drop.'"

Fully persuaded that if the coloring of milk could be prevented its adulteration would be proportionally decreased, because uncolored (but watered or skimmed milk) would be, in many cases, detected by consumers, it was decided to notify all dealers that they would be liable to complaint if colored milk, intended for sale, was found in their possession.

It would have been useless, however, to have attempted the enforcement of the statutes which prohibit color in milk as "a foreign substance," until some better and more practical method for the detection of annatto had been devised. Many experiments were made by the Inspector in this direction. The ordinary process for the detection of annatto, as given in the books, requires the evaporation of 200 to 500 c.c., of the milk, and extraction of the nearly dried residue with alcohol. The alcoholic solution must then be evaporated to a small bulk and the residue tested for the well-known color reactions of annatto.

It is obvious that the evaporation of so large a quantity of milk ($\frac{1}{2}$ pint to 1 pint) necessarily precludes the examination by this method of any considerable number of samples in a single day; it is open, also, to the objection that the coloring matter of annatto is not by this process fully separated from the sugar of milk, which interferes with and modifies the color reactions; the process is also objectionable on the ground of the extreme liability of destroying more or less of the unstable coloring principles of annatto by the long-continued high temperature necessary to the repeated evaporation of the milk and the alcoholic extract.

The following, so far as known, original process was finally adopted, and, after more than six months' trial, it can be recommended as thoroughly satisfactory and reliable: One hundred cubic centimetres of milk rendered alkaline by the addition of five cubic centimetres of solution of carbonate of soda (1 of carbonate of soda to 3 of water) are poured into a glass jar about one and a half inches in diameter and four to five inches in height. Into this is placed a strip of filter-

paper (Schleicher and Schull's extra heavy — No. 598) about five and a half inches long and one half inch wide, — the end of the paper being folded over the edge of the glass so as to be suspended in the alkaline milk. The paper is allowed to remain for twelve hours or over night; at the expiration of this time the strip of paper is withdrawn and washed under the water-tap, when, if annatto be present in the milk, the paper appears of a pale salmon color, which is best seen when the moist strip is laid on a piece of white filter-paper. The moist strip of paper dipped into a solution of stannous chloride develops a decided pink color. By this means a mere trace of annatto (one teaspoonful of the ordinary solution, as used by milkmen, to fifty cans of milk or one part to one hundred thousand) is distinctly perceptible. With the quantity most frequently employed (one teaspoonful to ten cans) the pink color is very strongly marked.

It is important that the milk be made decidedly *alkaline;* for if the milk sours, the annatto color, being insoluble in acids is precipitated, and is not in this state capable of dyeing the filter-paper. The size of the paper, for one hundred cubic centimetres of milk, should not be very much larger than indicated above, otherwise the coloring matter, being spread over a greater surface, is less distinctly visible. It is a convenient way to distinguish the specimens examined by writing with lead-pencil the name of the vendor, and a figure corresponding to the number of the analysis, upon the paper itself previous to dipping it into the milk. By this method it has been possible to make as many as fifty tests for annatto, in as many specimens of milk, in a single day. The strips of paper are put into the milk as soon as the specimens are brought to the office, and examined the following morning.

The coloring principle of annatto (bixin), being by this method perfectly separated from all other substances present in milk, may be further tested upon the paper itself by any of the color reactions of annatto. The pink color produced by stannous chloride may be changed to the original salmon color by immersing the paper in a dilute solution of sodium carbonate. The strip should be well washed, to remove excess of alkali, and carefully dried without heat; it may then be tested with sulphuric acid, which produces a bluish color (generally with pink edges), or, where a mere trace of annatto be present, a purplish or very pale-greenish shade. To prevent the acid from exerting too strong a corrosive action upon the fibre of the paper, it is convenient to dilute the acid with one-half its volume of water (two volumes of acid to one volume of water), using the acid only when it has become cold.

Section five of chapter fifty-seven of the Public Statutes

(as amended by section two of chapter three hundred and eighteen of the Acts of 1886) provides that: —

> Whoever, by himself or by his servant or agent, or as the servant or agent of any other person, sells, exchanges, or delivers, or has in his custody or possession with intent to sell or exchange, or exposes, or offers for sale or exchange, adulterated milk, or milk to which water or *any foreign substance* has been added, or milk produced from cows fed on the refuse of distilleries, or from sick or diseased cows, or milk not of good standard quality, shall, for a first offence, be punished by fine of not less than fifty nor more than two hundred dollars; for a second offence, by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment in the House of Correction for not less than thirty nor more than sixty days; and, for a subsequent offence, by fine of fifty dollars, and by imprisonment in the House of Correction for not less than sixty nor more than ninety days.

Under this section complaints have been drawn charging A. B. with "having in his possession, with intent to sell, a certain quantity, to wit: one pint of adulterated milk, that is to say, milk to which a certain foreign substance had been added, to wit: annatto coloring-matter, etc., etc." This form of complaint has been sustained, and under it numerous convictions have been obtained.

Boracic Acid.

During the warm season some milkmen have been in the habit of adding a small quantity of boracic acid to their milk, for the purpose of preventing it from becoming sour. This practice is objectionable on many grounds. The mere fact that a substance is capable of checking or preventing fermentation in a food product leads to a very strong presumption that the food so preserved will be less digestible than in its natural state. This opinion has been confirmed by Dr. William K. Newton, health-officer of Paterson, New Jersey, whose experiments in this direction tend to show that the artificial digestion of milk to which preservatives have been added was, by these agents, interfered with or checked altogether.

Analyses of Milk.

The following are analyses of samples of adulterated milk, or milk not of standard quality, obtained from wagons of persons against whom complaints have been made during the year: —

Name.	Place of Business.	Date.	Total Solids.	Solids not Fat.	Fat.	Ash.	Other Impurities.
Oscar S. Bailey	Dedham . .	Oct. 18,	10.52	8.24	2.28	0.58	
Bennett & Beckman . .	E. Boston . .	Sept. 15,	12.50	9.60	2.90	0.68	Annatto.
Bennett & Beckman . .	E. Boston . .	Sept. 20,	12.70	9.70	3.00	0.60	Annatto.
Charles M. Black . . .	Somerville .	Feb. 13,	11.84	8.58	3.26	0.58	
Charles M. Black . . .	Somerville .	Feb. 20,	11.14	8.50	2.64	0.64	
Charles M. Black . . .	Somerville .	July 8,	11.78	9.64	2.14	0.64	
Charles M. Black . . .	Somerville .	Aug. 11,	11.04	8.26	2.78	0.56	
Eben C. Colby	Everett . . .	June 22,	11.96	9.70	2.26	0.68	
Patrick Connolly . . .	Charlestown,	Oct. 16,	8.50	6.84	1.66	0.44	
Sylvester L. Cummings,	E. Somerville,	Oct. 24,	12.86	9.58	3.28	. . .	Annatto.
Sylvester L. Cummings,	E. Somerville,	Oct. 24,	. . .	. . .	. . .	. . .	Annatto.
John P. Dailey	E. Lexington,	Aug. 19,	12.00	9.94	2.06	0.72	
John P. Dailey	E. Lexington,	July 6,	12.16	10.14	2.02	0.66	
Lewis E. Daniels . . .	Cambridgep't,	Aug. 20,	11.60	8.40	3.20	0.54	
James Doyle (driver for Mary Moakley) . . .	E. Lexington,	Aug. 10,	11.72	8.60	3.12	0.60	
Henry S. Draper . . .	W. Dedham .	April 22,	11.16	9.00	2.16	0.54	
Henry S. Draper . . .	W. Dedham .	Aug. 18,	11.90	9.44	2.46	0.64	
Henry S. Draper . . .	W. Dedham .	Sept. 8,	10.36	8.96	1.40	0.54	Annatto.
Henry S. Draper . . .	W. Dedham .	Sept. 20,	. . .	. . .	. . .	. . .	Annatto.
Henry S. Draper . . .	W. Dedham .	Nov. 1.	11.34	10.02	1.32	0.68	
B. Eames & Co.	Boston . . .	Feb. 16,	11.42	8.32	3.10	0.56	
Byron Eames	Boston . . .	Aug. 14,	13.02	9.92	3.10	0.72	Annatto.
Byron Eames	Boston . . .	Aug. 21,	12.20	10.00	2.20	0.64	Annatto.
Byron Eames	Boston . . .	Sept. 27,	. . .	. . .	. . .	. . .	Annatto.
Seth J. Eames	Boston . . .	Aug. 10,	12.12	8.86	3.26	0.60	
Seth J. Eames	Boston . . .	Aug. 10,	11.78	8.78	3.00	0.66	
Seth J. Eames	Boston . . .	Sept. 14,	11.46	9.46	2.00	0.66	
Seth J. Eames	Boston . . .	Sept. 14,	10.80	9.58	1.22	0.70	Annatto.
Fallon Bros.	Mattapan . .	Feb. 13.	11.62	8.76	2.86	0.62	
Fallon Bros.	Mattapan . .	Aug. 7,	11.80	9.50	2.30	0.68	Annatto.
Stephen F. Forbush . .	Dorchester .	Aug. 14,	12 74	8.42	3.32	0.74	
Stephen F. Forbush . .	Dorchester .	Aug. 31,	11.96	8.82	3.14	0.70	Soda Carbonate.
Stephen F. Forbush . .	Dorchester .	Sept. 16,	12.06	9.94	2.12	0.70	
Stephen F. Forbush . .	Dorchester .	Dec. 21,	11.58	8.58	3.00	0.60	
Henry W. Furbush . .	Charlestown,	Dec. 13,	10.64	8.04	2.60	0.58	Marked "Skimmed Milk."
Charles E. Giles	Somerville .	July 30,	12.44	9,34	3.10	0.66	Annatto, Boracic Acid.
Francis J. Green . . .	Boston . . .	Aug. 18,	10.74	9.30	1.44	0.66	
Walter G. Green . . .	Everett . . .	July 26,	11.90	8.80	3.10	0.60	

Name.	Place of Business.	Date.	Total Solids.	Solids not Fat.	Fat.	Ash.	Other Impurities.
Walter G. Green . . .	Everett . . .	Sept. 12,	11.50	9.10	2.40	0.60	Annatto.
Albert F. Hale	Somerville .	Aug. 7,	11.92	9.58	2.34	0.66	
Albert F. Hale	Somerville .	Aug. 11,	12.84	9.88	2.96	0.64	
Albert F. Hale	Somerville .	Aug. 26,	10.20	8.40	1.80	0.54	Annatto.
Albert F. Hale	Somerville .	Nov. 8,	11.44	8.64	2.80	0.60	Annatto.
Albert F. Hale	Somerville .	Dec. 24,	11.20	8.48	2.72	0.60	
Fredk. W. Hale	Somerville .	Sept. 7,	10.60	8.16	2.44	0.56	Marked "Skimmed Milk."
Chas. W. Harris . . .	Charlestown,	Aug. 5,	10.80	9.20	1.60	0.62	
Chas. W. Harris . . .	Charlestown,	Oct. 24,	12.14	10. 06	2.08	0.66	Annatto.
Chas. W. Harris . . .	Charlestown,	Oct. 24,	12.06	9.84	2.22	0.66	Annatto.
Herbert I. Hicks	Charlestown,	July 17,	12.04	9.44	2.60	0.68	
Herbert I. Hicks	Charlestown,	Oct. 24,	12.34	9.64	2.70	0.64	
Linus M. Hartwell . . .	Charlestown,	April 24,	11.60	8.94	2.66	0.58	
Linus M. Hartwell . . .	Charlestown,	Oct. 24,	13.14	9.7	3.38	0.60	Annatto.
Benj. F. Holt	Charlestown,	Feb. 20,	11.96	9.40	2.56	0.68	
Benj. F. Holt	Charlestown,	May 4,	11.68	9.14	2.54	0.60	
Benj. F. Holt	Charlestown,	May 11,	11.80	9.10	2.70	0.60	
Benj. F. Holt	Charlestown,	May 20,	11.96	9.28	2.68	0.62	
Benj. F. Holt	Charlestown,	July 13,	11.16	8.76	2.40	0 60	
Benj. F. Holt	Charlestown,	July 24,	11.82	9.32	2.50	0.62	
Benj. F. Holt	Charlestown,	July 24,	11.56	9.36	2.20	0.64	
Benj. F. Holt	Charlestown,	Aug. 11,	11.74	8.78	2 96	0.60	
Benj. F. Holt	Charlestown,	Sept. 12,	11.76	9.80	1.96	0.64	Boracic Acid.
Benj. F. Holt	Charlestown,	Sept. 12,	11.16	9.26	1.90	0.62	Boracic Acid
Benj. F. Holt	Charlestown,	Sept. 27,	11.84	9.34	2.50	0.64	
Benj. F. Holt	Charlestown,	Sept. 27,	11.60	9.18	2.42	0.64	
Benj. F. Holt	Charlestown,	Oct. 1,	11.20	8.78	2.42	0.64	
Benj. F. Holt	Charlestown,	Oct. 16,	11.60	8.74	2.86	0.60	
Benj. F. Holt	Charlestown,	Dec. 10,	11.82	9.06	2.76	0.66	
Eugenia A. Howe . . .	Dedham . .	July 6,	11.82	9.32	2.50	0.68	
Eugenia A. Howe . . .	Dedham . .	Sept. 20,	12.70	9.86	2.84	0.62	Annatto.
John Keenan	Boston	May 4,	11.52	8.96	2.56	0.62	
John Keenan	Boston . . .	July 13,	11.00	7.28	3.72	0.59	
Chas. E. Kendall . . .	Waltham . .	Feb. 9,	10.92	8.60	2.32	0.64	
Chas. E. Kendall . . .	Waltham . .	Feb. 11,	10.76	9.56	1.20	0.70	
Chas. E. Kendall . . .	Waltham . .	Feb. 20,	11.56	8.42	3.14	0.62	
Chas. E. Kendall . . .	Waltham . .	Oct. 13,	10.90	8.74	2.16	0.68	Marked "Skimmed Milk."
Chas. A. Kenneson . .	Somerville .	July 24,	10.26	8.46	1.80	0.58	Marked "Skimmed Milk."

Name.	Place of Business.	Date.	Total Solids.	Solids not Fat.	Fat.	Ash.	Other Impurities.
Chas. A. Kenneson . .	Somerville .	July 24,	10.70	8.30	2.40	0.56	Marked "Skimmed Milk."
Chas. A. Kenneson . .	Somerville .	July 24,	11.50	8.80	2.70	0.60	Marked "Skimmed Milk."
Chas. A. Kenneson . .	Somerville .	Aug. 4,	11.54	8.70	2.84	0.58	Marked "Skimmed Milk."
Chas. A. Kenneson . .	Somerville .	Aug. 2,	11.80	8.70	3.10	0.60	Marked "Skimmed Milk."
Chas. A. Kenneson . .	Somerville .	Sept. 16,	11.94	8.98	2.96	0.60	
John H. Kenneson . .	Somerville .	Feb. 20,	10.54	7.80	2.74	0.64	
John H. Kenneson . .	Somerville .	Feb. 20,	10.64	7.84	2.80	0.62	
John H. Kenneson . .	Somerville .	July 1,	11.18	9.24	1.94	0.60	
John H. Kenneson . .	Charlestown,	Dec. 13,	10.96	9.00	1.96	0.60	Marked "Skimmed Milk."
John H. Kenneson . .	Charlestown,	Dec. 24,	11.10	9.00	2.10	0.72	Annatto.
James W. Kimball . .	Somerville .	Sept. 18,	11.74	9.10	2.64	0.64	
James W. Kimball . .	Somerville .	July 24,	11.96	8.86	3.10	0.60	
Omar G. Kinsman . . .	Boston . . .	May 13,	10.74	8.04	2.70	0.56	
Omar G. Kinsman . . .	Boston . . .	July 2,	11.76	9.50	2.26	0.64	
William A. Lally . . .	South Boston,	April 15,	11.80	9.70	2.10	0.62	
William A. Lally . . .	South Boston,	June 22,	11.50	9.16	2.34	0.56	
Geo. A. Lingley & Co.	Medford . .	June 25,	11.74	9.98	1.76	0.62	
Geo. A. Lingley & Co. .	Medford . .	July 2,	11.58	8.76	2.82	0.62	
Irving Locke	E. Lexington,	July 31,	11.62	8.72	2.90	0.68	
Irving Locke	E. Lexington,	Aug. 19,	11.50	9.44	2.06	0.70	
Frank Lovis	South Boston,	Dec. 23,	11.02	8.30	2.72	0.56	Annatto.
Conrad Merkle	Boston . . .	May 29,	10.42	7.46	2.96	0.46	
Mary P. Merriam . . .	Somerville .	March 9,	11.86	9.46	2.40	0.66	
Mary P. Merriam . . .	Somerville .	April 20,	11.66	9.56	2.10	0.60	
Mary P. Merriam . . .	Somerville .	May 6,	11.50	9.16	2.34	0.62	
Mary P. Merriam . . .	Somerville .	July 6,	11.84	9.44	2.40	0.60	
Mary P. Merriam . . .	Somerville .	July 30,	11.08	8.70	2.38	0.58	
Mary P. Merriam . . .	Somerville .	Sept. 12,	8.98	7.28	1.70	0.48	Annatto.
Mary P. Merriam . . .	Somerville .	Sept. 12,	9.30	7.76	1.54	0.46	Annatto.
Robert A. Miner . . .	Charlestown,	June 4,	11.94	9.30	2.64	0.68	
John R. Mitchell . . .	Somerville .	July 17,	12.64	9.80	2.80	. . .	Annatto.
John R. Mitchell . . .	Somerville .	July 24,	12.18	9.58	2.66	0.72	Annatto, Boracic Acid.
John R. Mitchell . . .	Somerville .	July 31,	12.16	9.26	2.90	0.62	
John R. Mitchell . .	Somerville .	Aug. 13,	12.06	9.36	2.70	0.68	Annatto.
Joseph W. Moore . . .	Arlington . .	Feb. 11,	11.30	9.40	1.90	0.66	
Joseph W. Moore . . .	Arlington . .	March 26,	9.96	7.66	2.30	0.58	

Name.	Place of Business.	Date.	Total Solids.	Solids not Fat.	Fat.	Ash.	Other Impurities.
Joseph W. Moore . . .	Arlington . .	June 18,	11.86	8.94	2.92	0.58	
Joseph W. Moore . . .	Arlington . .	July 8,	11.44	8.44	3.00	0.64	Annatto.
Joseph W. Moore . . .	Arlington . .	Aug. 11,	12.44	9.36	3.08	0.60	Annatto.
Joseph W. Moore . . .	Arlington . .	Sept. 7,	11.96	9.16	2.80	0.56	
Joseph W. Moore . . .	Arlington . .	Sept. 18,	11.74	9.90	1.84	0.68	
Frank E. Murdock . .	Charlestown,	April 1,	11.40	10.34	1.06	0.70	
Frank E. Murdock . .	Charlestown,	Sept. 20.	11.86	9.34	2.52	6.64	
John P. Murphy . . .	Quincy . . .	Aug. 3,	11.50	8.46	3.04	0.60	
John P. Murphy . . .	Quincy . . .	Aug. 23,	11.76	8.80	2.96	0.60	
John Newton (Driver for Henry Kelly) . .	Boston . . .	Jan. 19,	11.38	9.34	2.04	0.66	
John Newton (Driver for Henry Kelly) . .	Boston . . .	May 3,	11.44	9.10	2.34	0.58	
John Newton (Driver for Henry Kelly) . .	Boston . . .	July 10,	9.36	7.64	1.72	0.56	
Paige & Gove	Cambridge .	Sept. 15,	11.00	8.36	2.64	0.60	
Paige & Gove	Cambridge .	Oct. 5,	10.84	10.00	0.84	0.74	
Converse M. Pettingill .	Everett . .	Aug. 9,	11.70	8.98	2.72	0.58	
Ephraim H. Raymond .	Somerville .	July 19,	12.02	9.62	2.40	0.66	Annatto. Boracic Acid.
Ephraim H. Raymond .	Somerville .	Aug. 4,	12.00	8.96	3.04	0.62	Annatto.
John M. Savage	Charlestown,	Feb 9,	10.74	8.38	2.36	0.60	
John M. Savage	Charlestown,	June 14,	10.12	7.38	2.74	0.50	
John M. Savage	Charlestown,	June 25,	12.04	9.52	2 52	0.62	
Walter W. Scott . . .	Somerville .	May 11,	10.88	8.14	2.74	0.54	
Walter W. Scott . . .	Somerville .	Oct. 16,	12.30	9.54	2.76	0.64	
Walter W. Scott . . .	Somerville .	Oct. 24,	12.02	9.22	2.80	0.66	
John Sias	Boston . . .	April 22,	11.34	8.78	2.56	0.56	
John Sias	Boston . . .	Sept. 4,	10.86	8.56	2.30	0.60	Marked "Skimmed Milk."
Edwin N. Simonds . .	Somerville .	Aug. 11,	12.14	9.24	2.90	0.70	Annatto. Boracic Acid.
Edwin N. Simonds . .	Somerville .	Aug. 23,	12.60	9.50	3.10	0.64	Annatto.
Frank A. Smith	So. Boston .	Sept. 18,	12.24	9.20	3.04	0.56	Annatto.
Southward Bros. . . .	Charlestown,	Dec. 10,	11.12	8.50	2.62	0.62	
Chas. H. Stearns . . .	Somerville .	May 5,	11.80	9.04	2.76	0.60	
Chas. H. Stearns . . .	Somerville .	July 7,	11.76	9.24	2.52	0.66	
Chas. H. Stearns . . .	Somerville .	July 10,	11.80	8.94	2.86	0.60	Annatto.
Sam'l H. Storer	Somerville .	June 9,	11.72	9.52	2.20	0.68	
Ferdinand L. Stowell .	Charlestown,	May 11,	11.28	8.98	2.30	0.62	
Ferdinand L. Stowell .	Charlestown,	May 11,	10.80	8.50	2.30	0.64	
Frank D. Tarlton . . .	Boston . . .	Sept. 9,	11.70	9.45	2.25	. . .	Annatto.
Frank D. Tarlton . . .	Boston . . .	Sept. 12,	. . .	. . .	. . .	. . .	Annatto.

Name.	Place of Business.	Date.	Total Solids.	Solids not Fat.	Fat.	Ash.	Other Impurities.
Frank D. Tarlton . . .	Boston . . .	Sept. 12,	. . .	. . .	. . .	. . .	Annatto.
Henry H. Tyler	Lexington . .	Aug. 19,	11.98	9.62	2.36	0.70	Annatto.
Geo. H. Ware	W. Roxbury,	Nov. 10,	10.54	8.60	1.94	0.60	Annatto.
John H. Weston . . .	Somerville .	July 10,	11.50	8.70	2.80	0.66	Annatto. Boracic Acid. Marked "Skimmed Milk."
John H. Weston . . .	Somerville .	July 10,	10 80	8.20	2.60	0.72	Boracic Acid. Marked "Skimmed Milk."
Herbert Wetherbee . .	Boston . . .	Sept. 4,	11.24	8.74	2.50	0.74	Annatto.
Herbert Wetherbee . .	Boston . . .	Nov. 8,	. . .	. . .	. . .	. . .	Annatto.
Willard & Fuller . . .	Cambridgep't,	July 8,	10.76	8.76	2.02	0.74	Annatto. Boracic Acid.
Henry P. Worthley . .	Arlington . .	Aug. 21,	12.04	9.08	2.96	0.60	
Leo Volk	Dedham . .	April 2.	11,76	8.16	3.60	0.58	
Leo Volk	Dedham . .	Aug. 18,	11.72	8.78	2.94	0.60	
Leo Volk	Dedham . .	Nov. 30,	11.60	8.54	3.06	0.60	
Orson Young	Somerville .	April 19,	10.96	8.36	2.60	0.56	
Orson Young	Somerville .	May 11,	9.26	7.10	2.16	0.54	
Orson Young	Somerville .	June 15,	11.36	7.68	3.68	0.46	
Orson Young	Somerville .	June 22,	10.90	8.36	2.54	0.56	
Orson Young	Somerville .	Aug 11,	11.64	8.36	3.28	0.64	

CHANGES IN THE MILK LAW.

Section 2 of chapter 57, of the Public Statutes, as amended by chapter 352 of the Acts of 1885, provided, in defining the duties of Milk Inspectors, that they "or their assistants may enter all places where milk is stored or kept for sale, and all carriages used for the conveyance of milk, and the said inspectors or their assistants may take samples for analysis from all such places or carriages;" and by chapter 310 of the Acts of 1884 it was provided that "whoever hinders, obstructs or in any way interferes with any Inspector of Milk, or any servant or agent of an inspector, in the performance of his duty, shall be punished, etc." Very soon after your inspector entered upon his duties in April, 1885, it was found that a considerable number of milk-peddlers were not disposed to allow the collectors of samples, employed by the department, to take such samples of milk as they desired, and such as it was believed they had a right to take under the provisions of the statutes above quoted. The difficulty was one which re-

quired prompt action, for such refusals began to be of almost daily occurrence. Accordingly, one Smith, a driver for Charles A. Kenneson of Somerville, was complained of, for obstruction of John Killeen, a regularly employed agent of the Inspector for the collection of samples. The conviction of the defendant was the result of his trial in the Superior Court, but exceptions were taken to the rulings of the presiding justice and carried to the Supreme Court. In the latter part of February, 1886, the opinion of the Court was given, sustaining the exceptions upon the ground that the statutes did not give any express power to the inspectors to employ servants or agents, and holding that the evidence tended to show that Killeen was acting according to his own discretion and not under the immediate direction of an inspector.

The effect of this decision was, at first, very embarrassing to the department, for, without the power to select and take specimens of milk directly from milk-wagons, its efficiency in protecting the public from the evils of adulterated milk would be greatly impaired.

A bill was drawn making the necessary amendments, and meeting the decision of the Supreme Court, which was submitted to the Legislature, and became a law June 23, 1886. Its provisions were, that: —

> Said inspectors may, with the approval of the mayor or the selectmen, employ suitable persons to act as collectors of samples, who shall be sworn before entering upon their duties. Said inspectors, or the collectors employed and qualified as aforesaid, may enter all places where milk is stored or kept for sale, and all carriages used for the conveyance of milk, and the said inspectors or the collectors may take samples for analysis from all such places or carriages.

Under the operation of this section no difficulty has been experienced in obtaining the necessary specimens whenever and wherever the Inspector or the collectors have attempted to exercise their authority.

The presentation of this matter to the Legislative Committee on Health gave certain milk-dealers the opportunity they had been seeking, to open the whole milk-question, and particularly the standard for pure milk fixed by the statute, which some declared to be too high. The matter was fully discussed, the milk-dealers being represented by able counsel; but the committee, after hearing representatives of several local granges, and of the New England Milk Producers' Association, Milk Inspectors from various cities, and the State Board of Health, refused to make any change in the standard as provided in the existing law.

The report of the committee was, however, during its

passage through the Legislature amended, so that the following changes were finally adopted: —

The section declaring that milk containing less than 13 per cent. of milk solid should be deemed to be *adulterated*, was changed so that such milk should be deemed to be not of *standard quality*, and a provision added, prohibiting the sale of milk which was not of standard quality. It was further provided that the standard during the months of May and June should be 12 per cent. of milk solids.

The Milk Standard.

No one can fairly object to a law which requires a food product, and especially one of the importance of milk, to be of *good standard quality*. No one who purchased a bushel of potatoes would be satisfied if they were not of average size, and no purchaser who had been cheated by small potatoes would "be satisfied if told that they grew on as fine a piece of land as is to be found in the State." In like manner a purchaser of milk expects, and has a right to expect, that the article furnished shall be at least of *average* quality; he has no right to expect Jersey milk with its possible 18 or 20 per cent. of milk solids, nor, on the other hand, ought he to be compelled to receive whatever a milk-dealer may choose to give him, no matter how poor the quality, simply because it happened to be pure, and "just as it came from the cow" — for it is well known that by certain methods of feeding, the flow of milk may be greatly increased, while the quality of the product is correspondingly depreciated.

In view of these facts the Legislature has enacted that milk, if sold, must be of good standard quality, — and that standard quality means not less than 13 per cent. of milk solids (except during May and June, when 12 per cent. of milk solids is made the standard). Is this a fair standard? The universal testimony of all the leading authorities of the world agrees that it is. During the year 1886 the State Board of Health, Lunacy and Charity instituted an inquiry relative to the quality of milk produced in Massachusetts, and reported, as the result of the analysis of the milk of 601 cows, as follows: —

Average solids of samples from 209 single animals .	13.21
Average solids of all samples of milk from public institutions, mixed and single (175 animals) . .	13.00
Average solids of all samples of milk obtained from private farms, mixed and single (426 animals) .	13.36
Average solids of all samples of mixed milk and milk of single animals from all sources (601 animals)	13 26

Dr. Samuel W. Abbott, health-officer of the Board, in his report giving the above figures, says : —

> The samples were produced in 8 different counties of the State, including the two largest milk-producing counties (Middlesex and Worcester), and, considering the varying conditions of production, such as breed, age, time of day, and season of the year, character of feed, and other modifying circumstances, the result obtained — 13.36 per cent. of total solids — may be fairly considered as an average of the present milk product as furnished by the 150,000 milch-cows of Massachusetts. The difference in quality of the milk obtained from public institutions cannot materially affect this result, since the ratio of animals owned by them is less than 1 per cent. of the entire number in the State.

Dr. W. K. Newton, State Milk Inspector of New Jersey, in the Ninth Report of the Board of Health of that State, gives the analyses of milk obtained from 14 counties, which show an average of 14.88 per cent. of solids.

The New York State Dairy Commissioner, in his Second Annual Report (1886), gives the analyses of the milk of 70 dairies, representing 2,282 cows. The average solids of these samples was 13.60 per cent., being the same figure as that obtained by Bell in 1877 as the average solids from 181 cows from 17 English farms.

In a Report on Milk by Edward W. Martin, page 59, from the same document, the writer says :—

> Too low a standard would injure both consumer and producer. The consumer because, if the standard was much below that of pure milk, the law would be merely an incentive to the dishonest producer to adulterate his product, thereby not only injuring the consumer, but, by increasing the quantity and decreasing the quality, injure the producer, as the price of such milk would undoubtedly be lower.

The following incident well illustrates some of the reasons why certain milk-peddlers are continually claiming that the milk standard is too high. On the 9th of June, 1886, a certain milk-peddler of Boston, Mr. H——, called at the Inspector's office, bringing three samples of milk, which, he stated, were received from certain dairies which supplied him with a part of his load. The milk was claimed to be "just as he got it," but corresponded closely with a considerable number of poor samples taken from his wagon during the preceding months. Certain dairy-marks, such as contractors and farmers are in the habit of using to distinguish different dairies, accompanied the samples. These samples were analyzed, and gave results which showed that all three of the specimens had been more or less skimmed, — one of them, and probably two, being also watered.

Analyses of the Three Samples:

	Total Solids.	Solids Not Fat.	Fat.
No. 1	12.34	10.06	2.28
No. 2	11.94	9.50	2.44
No. 3	11.04	8.76	2.28
Average	11.77	9.44	2.33

Having reason to doubt the truthfulness of the peddler's statement, a collector of samples attached to the office was sent to the railroad-car where the peddler obtained his milk, and learned that no dairies with the marks as given were supplied to him. While the peddler's team was being loaded with milk direct from the car samples were taken which analyzed as follows: —

	Total Solids.	Solids not Fat.	Fat.
No. 1	16.02	10.22	5.80
No. 2	14.40	9.70	4.70
No. 3	14,16	9.90	4.26
No. 4	14.04	10.04	4.00
No. 5	13.54	9.30	4.24
No. 6	13.42	9.20	4.22
No. 7	13.00	9.74	3.26
No. 8	12 94	9.20	3.74
No. 9	12.60	8.98	3.62
Average	13.79	9.59	4.20

Thus it appeared that the milk received by the milkman (having 13.79 solids and 4.20 fat) was being systematically skimmed and watered until it stood only 11.77 solids and 2.33 fat.

This man but a short time since was an earnest advocate of a "lower standard."

The truth is, that those who claim that the standard should be lowered really object to any standard whatever. They would be pleased to abolish all standards, and sell milk "just as it came from the cow;" but, judging from past experience, we are of the opinion that the quality of milk which many

would sell if there were no standard, would never be better (if they knew it) than the milk produced by the poorest cow in Massachusetts.

Another illustration of the same kind is quoted from Dr. R. D. Clark, of Albany, New York, to be found in the Second Annual Report of the New York State Dairy Commissioner (pages 389, 390, 391).

Dr. Clark gives the analyses of certain samples of milk, which the milkmen declared was given to the inspector just as it came from the cows; and that, if it was below the standard, it was the fault of the cows, and not theirs.

Dr. Clark says, "In order to ascertain the truth of the matter, the dairy commissioner directed us to go to the dairies of these gentlemen and procure samples, which *we knew* to be 'just as it came from the cows.'"

The results were as follows: —

	Per cent. of solids in Milk claimed to be pure by Milkmen.	Per cent. of solids in Milk as found by the Inspector.
No. 6	11.90	13.52
No. 23	11.26	13.22
No. 24	11.70	13.35
No. 25	11.24	13.51
No. 28	12.20	13.11

Cases of this sort are to be found in the experience of every milk analyst of any experience. An able lawyer in presenting his case (*i.e.*, an attempt to lower the milk standard) before a committee of the Massachusetts Legislature used the following language: —

Innocent men, no matter how honest, how anxious, how diligent, are liable to prosecution, fine, and it may be imprisonment. . . .

Take the case of a young man formerly the treasurer of a certain association for several years. During his term of office many thousands of dollars passed through his hands with the most unscrupulous accuracy. Tried, and found faithful to his trust, upright and honorable in all his relations, he had earned for himself, not only the confidence of his employers and business associates, but also the respect and admiration of the community in which he lived. Not long since, he went into the milk business in Boston. As he himself repeatedly said, he meant to make a living, and an honest living. That he would stoop to a mean, little, dishonest traffic in watered milk, no one who knows him would for a moment believe. One day a sample of his milk was taken by the inspector. Some time after he was summoned into court, charged with the crime of having in his possession "adulterated milk with intent to sell the same," and put upon his trial. The milk was below the legal standard. He didn't know it. He couldn't know it. So far as he was

able to determine, it was not adulterated, but came directly from the cow. This, however, he was not permitted to show; it was no answer to the complaint. His innocence was no defence. It was below 13 per cent. solids. Judgment, "guilty." Fine, $50 and costs, which he was obliged to pay; and, though it was not stated, yet, if the provisions of this despicable law were carried out, the fact of his conviction was also published in the newspapers to warn the public against the danger of trading with this convicted criminal. The effect upon an extremely sensitive nature may be easily imagined. Prizing his good name and reputation far dearer than the livelihood he was striving to earn, and keenly feeling the disgrace, he retired from the business, and still cannot help brooding over his misfortune. Compelled to be forever explaining that judgment of "guilty," which must remain on the record of the court against him, is too humiliating for him to endure. He cannot meet his friends and acquaintances as he used to meet them, and he is now anxiously looking for some opportunity to get away from his home and leave the State. One honest, upright young life well-nigh ruined, — the direct consequence of this despicable and cruel law. Is anybody proud of the result? What real or imaginary benefit to the public can justify this wrong?

The young man who was thus so pathetically alluded to recently went out of the milk business; and in conversation with the Inspector expressly stated that the two complaints upon which he had paid fines were made upon samples of milk which he himself had "fixed." In one case he stated that he had mixed about four cans of centrifugal skim-milk with ten cans of pure milk, and in this case, as in the second complaint, he had colored his milk with a potash solution of annatto called "benefit," after receiving notice to desist.

The right of the Legislature to prohibit the sale of milk below a certain standard has been affirmed by the judicial decisions of the highest courts in several of the States. In the case of The People *vs.* Cipperly, decided in the Court of Appeals of New York (1866), the opinion of Learned, P. J., of the court below, was concurred in, some quotations from the same being as follows:—

It is urged by the defendant that this statute may prevent the sale of milk which is in fact pure and unmixed with water. What determined the Legislature to fix this standard we do not know. But it may be supposed that different kinds of food produce different degrees of richness of milk. And it may be known to the Legislature that certain kinds of food, the softened and innutritious grain, left after the production of ale or grape-sugar will cause a great flow of watery milk; and it may be known to the Legislature that this watery milk, supplied as food to children, cheats them with the appearance of nourishment, and deprives them of that nutritious food which they need. It may be known to legislators, then, that milk below the standard, which they fix by this law, is unsuitable for food, and should not be sold. At any rate, all this is a matter for the Legislature. And in view of the peculiar difficulties which surround the attempt to secure wholesome milk to the people, it is by no means certain that the establishing of a definite standard is not a judicious provision. Its sole object is to regulate and control the quality of a certain article of food, in the inter-

est of the health of the people. And if the Legislature, knowing the difficulty of guarding against the watering or other adulteration of milk, deem it best to fix a standard of richness, I think this is within their power, and that, too, irrespective of the question, whether the milk is diluted after it is taken from the cow, or whether it is made watery in the animal itself, by giving such food as will produce a great flow of what might well be called milk and water.

In the State *vs.* Wayland Smith (Rhode Island Reports, Vol. XIV., p. 100), the opinion of the Supreme Court of Rhode Island upon this point is as follows: —

It is equally a fraud on the buyer, whether the milk which he buys was originally good, and has been deteriorated by the addition of water, or whether in the natural state it is so poor that it contains the same proportion of water as that which has been adulterated. Again, since it may sometimes happen, though we presume infrequently, that milk as it comes from the cow is below the standard required by the statute, it would manifestly be difficult for the prosecution to prove that its poor quality was due to adulteration, although in a very large majority of cases such would probably be the fact. By putting such milk in the same category with adulterated milk, the prosecution is relieved from the difficulty, and a loophole for the escape of offenders is closed. If a cow habitually gives milk of a quality so poor as to come within the statute, or as the defendant puts it, in his brief, so poor that, as a commercial commodity, it is valuable only for the purposes of irrigation, she is of no value as a milk-producer, and can have none as such to her owner, unless he can sell her milk to his unsuspecting neighbors for a price greatly in excess of its value, a species of fraud which ought not to be tolerated.

Oleomargarine.

What is known as oleomargarine is a product prepared from such materials, and in such a manner that it may serve as a substitute for butter.

Prof. Armsby, of the University and Agricultural Experiment Station of Wisconsin, gives the following description of the process of its manufacture. He says: —

Although numerous patents have been taken out for the manufacture of imitation butter, and a great variety of materials have been named in the specifications, the process as now conducted is comparatively simple. The raw materials are beef-tallow, leaf-lard, and the best quality of butter, together with small amounts of milk or cream and of butter-color.

From the beef-tallow is prepared the oleomargarine oil of Mège. The caul fat of freshly killed beeves is, after thorough washing, first in tepid and then in iced water, allowed to hang in a cold room until thoroughly cold. It is then rendered at a temperature between 130° and 175° F. The resulting oil is allowed to cool slowly until a considerable portion of the stearine and palmitin have crystalized out, and the pasty mass is then subjected to hydraulic pressure. The still fluid (about two-thirds of the whole) flows out into a tank of cold water, where it solidifies into a granular mass which is known in the trade as "oleo oil," or simply "oleo." The name "oil" is somewhat misleading,

as the product is a granular solid of a slightly yellow color. Fresh leaf-lard, treated in substantially the same way as the beef-tallow, yields the "neutral lard," or "neutral" of the trade, also a granular solid of a white color.

The objects of this treatment are twofold,—first, to produce fats as free as possible from taste or odor; second, to remove some of the difficultly fusible stearine and palmitin in order that the finished product may melt readily in the mouth.

Having thus secured the fats in proper condition, the manufacturer proceeds to mix the "oleo" and "neutral"—the proportions varying according to the destination of the product; a warm climate calling for more "oleo," a cold one for more "neutral"— and to flavor the mixture with butter. This flavoring is conducted in large, steam-jacketed vessels provided with revolving paddles, by which their contents can be thoroughly agitated. Here the "oleo" and "neutral" are melted, and thoroughly agitated with a certain proportion of milk, or sometimes of cream, and a proper amount of butter-color. Forty-eight gallons of milk per two thousand pounds of product are stated to be a common proportion. After sufficient agitation, the melted mass is run into cold water, and as it cools is broken up by paddles so as to granulate the mass. After thorough washing, it is salted and worked exactly like butter. The product is known as oleomargarine. Although it contains hardly more than a trace of butter fat, the latter flavors the whole mass so strongly that when well salted, as it usually is, it might readily pass with an inexpert or careless consumer for a rather flavorless butter.

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Very exaggerated and absurd statements have been made, especially by the dairymen and their organs regarding the unhealthfulness of butterine and oleomargarine. The charges have in general been that the fat used is practically uncooked, and that raw animal fat is unwholesome; that filthy fat and fat from diseased animals are used, and that the product contains, or is liable to contain, the germs of disease; and that in cleansing these diseased and filthy fats, dangerous chemicals are used, which are not subsequently completely removed.

The manufacturers claim that imitation butter can only be made from the best quality of fat from freshly killed animals; and I know of no evidence which disproves their assertions.

As regards filthy processes of manufacture, it may safely be asserted that butterine could not successfully imitate butter were it not as clean as most things are which pass for clean in this dirty world.

The charge that dangerous chemicals are used in the manufacture may be disposed of in a few words. If a dangerous amount of any chemical which is claimed to be used were left in the finished product, the latter would be inedible. Should traces of these chemicals be found, their significance would not lie in themselves, but in the indication they would furnish that the original fats were impure and required chemical treatment.

Prof. W. O. Atwater, of Wesleyan University, Middleton, Conn., in recapitulating the points of similarity between genuine and imitation butter, says: —

Butter and oleomargerine have very nearly the same chemical composition; in digestibility there may be a slight balance in favor of butter, though for the nourishment of healthy persons this difference can hardly be of any considerable consequence; for supplying the body with heat and muscular energy, which is their chief use in nutrition, they are of practically equal value, excelling in this respect all our other common food materials. Such, at any rate, is the practically unanimous testimony of the latest and best experimental research.

In the report of the Chief Analyst to the Department of Internal Revenue of the Dominion of Canada for 1885, H. Sugden Evans says: —

> No valid objection can be made to the introduction of oleomargarines and butterines, if they are carefully and well made, from sound ingredients, for they are quite as wholesome and palatable as butter, and more so than carelessly made butter; and, from the absence of the readily changeable volatile acids, they are more stable and less liable to become rancid, and being producible of excellent quality, at a considably lower price than butter, they furnish, *if distinctly labelled and sold only as artificial butter*, a desideratum of great value, to those who are compelled to study closely their domestic economies, and who do not possess the necessary conveniences for keeping butter in good condition during our hot summers. But, while saying this much in favor of the compound, it is essential that strict legislation should, as it does in Massachusetts and elsewhere, enforce that every parcel or package of this artificial butter, when delivered to the public, should be distinctly and legibly labelled or branded, so that the purchaser may not be prejudiced, but be made perfectly aware of the nature of the commodity, and have no excuse for supposing it to be otherwise than an artificial butter.

The remarks and opinions above quoted may be taken as correct statements of the processes of manufacture and the healthfulness of this product.

It is but natural that a new product, which comes into competition with established interests, should excite the violent opposition of those pecuniarily affected or believed to be affected by it; and in the different States of the Union the Legislatures have passed laws of greater or less severity, and in many cases prohibitory, according to the importance of the dairy interests in each State. In Vermont, New York, Pennsylvania, Michigan, Minnesota and Ohio, the sale or manufacture of butter substitutes is prohibited, while the statutes of most of the other States attempt simply to regulate the sale of imitation butter, so that it may be sold for what it is, and not as genuine butter.

The first legislation in the State of Massachusetts, in relation to oleomargarine, was effected in 1881; and at that time it was provided that all butter substitutes should be stamped, labelled or marked with the words "adulterated butter," or, if the substitute were known as "oleomargarine," then to be labelled with this word in printed letters of plain Roman type, not less than 1 inch in length, upon the top and side of every tub, box, etc., containing the same. Provision was likewise made that in the case of retail sales, the article should bear a label, or wrapper, in a conspicuous place upon the outside of the package, having these words plainly marked in Roman letters not less than $\frac{1}{2}$ inch in length.

By the Acts of 1884 the words "imitation butter" were substituted for "adulterated butter."

By the Acts of 1885 the word "butterine" was allowed to be used upon the labels where the article was known by this name; and the style of letter used in the label was changed from a Roman to an uncondensed Gothic letter, not less than $\frac{1}{2}$ inch in length.

By the Acts of 1886 provision was made whereby all persons selling any butter substitutes were required to be duly licensed or registered at the office of the Inspector. In accordance with this provision which became a law June 23, 1886, circulars were prepared and sent to dealers, and resulted in the granting of 491 licenses to stores, and 92 licenses to wagons, being 583 licenses in all. During the year there have been made 4,382 oleomargarine and butter inspections; and it has been found that the provisions of the law in regard to marking are very generally complied with. There have been made 9 complaints, in 8 of which the defendants were convicted, and fined $100 each; and in one case the defendant was discharged. The revenue-bill passed by the Congress of the United States, which requires all retail dealers to pay a special tax of $48, and which went into operation November 1, has had the effect of considerably reducing the number of persons selling oleomargarine. The United States Collector of Internal Revenue declines to issue licenses to persons having only a wagon and not a store; and he informs me that he has granted 31 licenses to wholesale dealers, and 133 to retail dealers, being 164 licenses in all. This number may be taken as giving the number of persons at present selling oleomargarine in Boston. From the best information obtainable the United States law has not materially decreased the number of pounds of oleomargarine actually sold, but has had the effect of concentrating its sale into the hands of a smaller number of dealers. The process which we have adopted for the detection of oleomargarine is Meissl's modification of Reichert's method, which is based on a determination of the amount of volatile fatty acids obtained by following a particular method of manipulation. For this purpose 5 grammes of the thoroughly mixed butter are weighed out on a double filter paper, and then transferred to an Erlenmeyer flask; 10 cubic centimetres of an alcoholic solution of potassium hydrate (2 grammes of potassium hydrate in 10 cubic centimetres of alcohol of 70 per cent.) are then added, and the mixture heated on a water-bath, with a frequent agitation, until saponification is complete, and the alcohol fully evaporated.

The last traces of alcohol are readily removed by forcing air into the flask by means of a foot-bellows. 100 cubic centimetres of water are added to the contents of the flask, and

after the further addition of 50 cubic centimetres of diluted sulphuric acid (10 acid, 90 water) the flask is connected with a Liebig's condenser, and 100 cubic centimetres distilled.

The distillate is titrated with a decinormal solution of sodium hydrate.

The distillate from pure butter requires from 25 to 31 cubic centimetres of the normal alkaline solution.

For the detection of annatto coloring in butter a modified method of that used for the same purpose in milk may be employed. The butter is saponified by soda and the solution of such poured into a test tube. A piece of paper is soaked in the solution, which dyes the paper if annatto be present. The coloring-matter upon the paper is tested for annatto as previously described in the case of milk.

Vinegar.

During the year 1886 there have been made 873 inspections of vinegar, of which 32.52 per cent. did not come up to the statute requirements. It has been found that in the great majority of cases the store-keepers were very willing to comply with the law; they are frequently deceived by the wholesale dealers, of whom they purchase their vinegar; but in most cases, on receiving notice from this office, promptly return such goods, and obtain others which will stand the necessary tests.

The methods adopted for testing vinegar are the same as those which have been in use in this office for several years past, and have been described in previous reports.

Dr. B. F. Davenport has given in the "New England Grocer" of October 27, 1886, a detailed practical method of determining whether a sample of cider vinegar conforms to the requirements of the statutes, from which we make the following extracts:—

As the limits set by the statute are in per cents. by weight, the portion of vinegar taken for the tests should, for perfect accuracy, be also taken by weight, that is, the quantities of 6 and of 10 grammes are to be taken for the tests of strength and of residue, but as taking it by measure, if of about the ordinary atmospheric temperature of 60 to 70 degrees F., will make the apparent percentage at most only 1 to 2 per cent. of itself greater than the true, that is, will make a true 5 per cent. vinegar appear to be, say from 5.05 to 5.10 per cent., measuring proves in practice to be accurate enough for all common commercial purposes, and therefore the quantities of 6 and of 10 cubic centimetres by measure may be taken in place of as many grammes.

All the measuring apparatus necessary for making the legal tests is one of the measuring tubes, called burettes. It is most convenient to have this of a size to contain 25 to 50 c.c., that is, cubic centimetres, and have these divided into tenths. The best form of burette is the Mohr's, which is closed by a glass stopcock. Besides this, only a

dropping-tube, called a pipette, graduated to deliver 6, and 10 c.c. will be needed. These tubes are to be obtained of any philosophical or chemical apparatus dealer, being articles generally kept in stock by them for common use, like yardsticks.

The only two chemicals needed in determining the strength of a vinegar are such as can be obtained of any competent apothecary in any city of the State. They are simply a small vial of a 1 per cent. solution of Phenol-phthalein in diluted alcohol, and a sufficient quantity of a solution of caustic soda, prepared as directed for "Volumetric Solution of Soda," upon page 399 of the last "U.S. Pharmacopœia," a book which is in the hands of every competent apothecary, as it contains the formulæ according to which he is required by the law of the State to prepare all such medicinal preparations as are mentioned therein.

Having these, the procedure for making the test will be as follows: Fill the pipette by suction, and then quickly close the top of it with the forefinger. Raise the tube out of the sample of vinegar and let it empty out by drops exactly down to the top graduation mark. This bearing the mark of o.c.c. Then, holding it over a white mug or cup, let it run out exactly down to the 6 c.c. mark. Dilute the 6 c.c. of vinegar, thus measured out into the mug, with sufficient clean water to make it look about white, and then add to it about three drops of the Phenol-phthalein solution. Then, having prepared the burette by filling it up to the top, zero, or any other noted mark of the graduation, with the volumetric solution of soda, let the soda solution run out cautiously into the diluted vinegar, which should be constantly stirred about. As soon as the vinegar in the mug begins to darken, the soda should then only be allowed to run into it by drops. This dropping is thus continued until at last a final drop of soda turns the vinegar suddenly to a permanent pink or cherry color, which will not disappear upon further stirring. By now reading off from the graduations of the burette the number of full c.c. divisions and of tenths which have been emptied out to bring about this change of color in the vinegar, is known the per-cents. and tenths of acidity equivalent to true acetic acid contained in the vinegar being examined.

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If in like manner 10 c.c. of the vinegar is exactly measured off by the pipette into a small light porcelain dish, and then evaporated fully to dryness over boiling water, the number of grammes weight gained by the dish, when multiplied by ten, gives the percentage of solid residue contained in the vinegar.

There are certain characteristics peculiar to the residue of a pure cider vinegar, the principal of which are the following: It will be about three per cent. in weight, and never less than two per cent. It is always soft, viscid, of apple flavor, somewhat acid and astringent in taste. A drop of it taken up in a clean loop of platinum or of iron wire and ignited in a colorless Bunsen gas-lamp flame, imparts to it the pale lilac color of a pure potash salt, without any yellow due to sodium being visible.

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In a pure apple cider vinegar hydrogen sulphide gas will not cause any discoloration, nor will the addition of a solution of either barium nitrate, silver nitrate, or ammonium oxalate cause anything more than the *very slightest* perceptible turbidity. But the addition of some solution of lead acetate—that is, of sugar of lead—will cause an immediate voluminous and flucculent precipitation, which will all settle out in about ten minutes, leaving a clear fluid above. In most of the so-called "apple vinegars" brought into this market from other States the addition of some of this lead solution will cause but a slight turbidity, without any precipitate settling out for several hours, and even then the precipitate will not be of the same appearance as in apple cider vinegar.

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To translate percentages of acid strength into the old commercial terms of grains of soda bicarbonate per troy ounce, the per cent. may be multiplied by 6.72; or, vice versa, divide the grains by the same factor. To reduce it into grains of potash bicarbonate, 8 would be the factor to be used in like manner.

I have given in an appendix several tables of interest to those engaged in testing milk in other cities, copies of the statutes relating to the inspection and sale of milk, butter, cheese, and vinegar, and reports of several recent decisions of the Supreme Judicial Court.

Respectfully submitted,

JAMES F. BABCOCK,

Inspector of Milk and Vinegar.

APPENDIX.

ORGANIZATION OF THE DEPARTMENT OF MILK INSPECTION FROM 1859 TO 1887.

Inspectors of Milk.

Henry Faxon, 1859–1879.
Martin Griffin, 1879–1884.
Bennet F. Davenport, M.D., 1884.
James F. Babcock, 1885–

Chemists employed by the Department.

Dr. A. A. Hayes, 1859.
Dr. Charles T. Carney, 1859–1862.
Dr. James C. White, 1862–1869.
Prof. James F. Babcock, 1869–1873.
Prof. John M. Merrick, 1873–1879.
Prof. Chas. E. Avery, 1879–1880.
Prof. James F. Babcock, 1879–1884.

Assistants in the Laboratory, 1884.

James O. Jordan,
Henry Ehrlich,
C. H. Preston.

ORGANIZATION OF THE DEPARTMENT OF THE INSPECTION OF MILK, BUTTER, AND VINEGAR FOR THE YEAR 1866–87.

Inspector of Milk, Butter, and Vinegar.

James F. Babcock, 1885–

Clerk.

William W. Griffin, 1885–

Assistant in Laboratory.

James O. Jordan, 1885–

Collectors of Samples.

John Killeen, 1885–
John T. Mullen, 1885–

THE LAWS OF MASSACHUSETTS

IN RELATION TO THE

SALE AND INSPECTION OF MILK.

[CHAPTER 57, PUBLIC STATUTES.]

SECTION 1. The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of milk for their respective places, who shall be sworn before entering upon the duties of their office. Each inspector shall publish a notice of his appointment for two weeks in a newspaper published in his city or town, or, if no newspaper is published therein, he shall post up such notice in two or more public places in such city or town.

SECT. 2. (*As amended by Section 1, of Chapter 318, of the Acts of 1886.*) Such inspectors shall keep an office, and shall record in books kept for the purpose the names and places of business of all persons engaged in the sale of milk within their city or town. Said inspectors may, with the approval of the mayor or the selectmen, employ suitable persons to act as collectors of samples, who shall be sworn before entering upon their duties Said inspectors, or the collectors employed and qualified as aforesaid, may enter all places where milk is stored or kept for sale, and all carriages used for the conveyance of milk, and the said inspectors or the collectors may take samples for analysis from all such places or carriages, and at the same time a portion of each sample so taken shall, if the person taking the same be requested so to do, be sealed and delivered to the owner or person from whose possession the same is taken, and a receipt given therefor to the person taking the same. The inspectors shall cause the samples of milk so taken to be analyzed or otherwise satisfactorily tested, the results of which analysis or test they shall record and preserve as evidence. The inspectors shall receive such compensation as the mayor and aldermen or selectmen may determine.

SECT. 3. In all cities and in all towns in which there is an inspector of milk, every person who conveys milk in carriages or otherwise, for the purpose of selling the same in such city or town, shall annually, on the first day of May, or within thirty days thereafter, be licensed by the inspector or inspectors of milk of such

city or town to sell milk within the limits thereof, and shall pay to such inspector or inspectors fifty cents each to the use of the city or town. The inspector or inspectors shall pay over monthly to the treasurer of such city or town all sums collected by him or them. Licenses shall be issued only in the names of the owners of carriages or other vehicles, and shall, for the purposes of this chapter, be conclusive evidence of ownership. No license shall be sold, assigned, or transferred. Each license shall record the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person engaged in carrrying or selling said milk, and the number of the license. Each licensee shall, before engaging in the sale of milk, cause his name, the number of his license, and his place of business, to be legibly placed on each outer side of all carriages or vehicles used by him in the conveyance and sale of milk, and he shall report to the inspector or inspectors any change of driver or other person employed by him which may occur during the term of his license. Whoever, without being first licensed under the provisions of this section, sells milk or exposes it for sale from carriages or other vehicles, or has it in his custody or possession with intent so to sell, and whoever violates any of the provisions of this section, shall, for a first offence, be punished by fine of not less than thirty nor more than one hundred dollars; for a second offence, by fine of not less than fifty nor more than three hundred dollars; and for a subsequent offence by fine of fifty dollars and by imprisonment in the house of correction for not less than thirty nor more than sixty days.

SECT. 4. Every person before selling milk or offering it for sale in a store, booth, stand, or market-place in a city or in a town in which an inspector or inspectors of milk are appointed, shall register in the books of such inspector or inspectors, and shall pay to him or them fifty cents to the use of such city or town; and whoever neglects so to register shall be punished for each offence by fine not exceeding twenty dollars.

SECT. 5. (*As amended by Section 2 of Chapter 318 of the Acts of 1886.*) Whoever, by himself or by his servant or agent, or as the servant or agent of any other person, sells, exchanges or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, or milk produced from cows fed on the refuse of distilleries, or from sick or diseased cows, or milk not of good standard quality, shall, for a first offence, be punished by fine of not less than fifty nor more than two hundred dollars; for a second offence, by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment in the house of correction for not less than thirty nor more than sixty days; and, for a subsequent offence, by fine of fifty dollars and by imprisonment in the house of correction for not less than sixty nor more than ninety days.

SECT. 6. Whoever, by himself, or by his servant or agent, or as the servant or agent of any other person, sells, exchanges, or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale as pure milk, any milk from which the cream or a part thereof has been removed, shall be punished by the penalties provided in the preceding section.

SECT. 7. (*As amended by Chapter 352, Acts of 1885.*) No dealer in milk, and no servant or agent of such a dealer, shall sell, exchange, or deliver, or have in his custody or possession with intent to sell, exchange, or deliver, milk from which the cream or any part thereof has been removed, unless in a conspicuous place above the centre upon the outside of every vessel, can, or package from or in which such milk is sold the words "**SKIMMED MILK**" are distinctly marked in uncondensed Gothic letters not less than one inch in length. Whoever violates the provisions of this section shall be punished by the penalties provided in section five.

SECT. 8 (*As amended by Chapter 310, Acts of 1884.*) Any inspector of milk, and any servant or agent of an inspector who wilfully connives at or assists in a violation of the provisions of this chapter, and whoever hinders, obstructs, or in any way interferes with any inspector of milk, or any servant or agent of an inspector in the performance of his duty, shall be punished by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment for not less than thirty nor more than sixty days.

SECT. 9. (*As amended by Section 2 of Chapter 318 of the Acts of 1886.*) In all prosecutions under this chapter, if the milk is shown upon analysis to contain more than eighty-seven per cent. of watery fluid, or to contain less than thirteen per cent. of milk solids, or to contain less than nine and three-tenths per cent. of milk solids exclusive of fat, it shall be deemed for the purpose of this act to be not of good standard quality, except during the months of May and June, when milk containing less than twelve per cent. of milk solids shall be deemed to be not of good standard quality.

SECT. 10. It shall be the duty of every inspector to institute a complaint for a violation of any of the provisions of this chapter on the information of any person who lays before him satisfactory evidence by which to sustain such complaint.

SECT. 11. Each inspector shall cause the name and place of business of every person convicted of selling adulterated milk or of having the same in his possession with intent to sell, to be published in two newspapers, in the county in which the offence was committed.

SECT. 12. (*Section 8 of Chapter 352 of the Acts of 1885.*) No person shall sell, exchange, or deliver, or have in his custody or possession with intent to sell, exchange, or deliver, skimmed milk containing less than nine and three-tenths per cent. of milk solids,

exclusive of fat. Whoever violates the provisions of this section shall be punished by the penalties provided in section five of chapter fifty-seven of the Public Statutes.

SECT. 13. (*Section 3 of Chapter 318 of the Acts of 1886.*) If the said inspector or collector, after being so requested, shall refuse or neglect to seal and deliver to the owner or person from whose possession the same is taken, as provided in section two, a portion of the sample taken as aforesaid, no evidence shall be received in any court of the results of the analysis or test of the same, which may have been recorded and preserved as aforesaid.

SECT. 14. (*Section 4 of Chapter 318 of the Acts of 1886.*) Whoever makes, uses, or has in his possession any imitation or counterfeit of any seal used by any milk inspector or his agents, and whoever changes, or in any manner tampers with, any sample taken nor sealed as provided in section two shall be punished by fine not exceeding fifty dollars, or by imprisonment in the house of correction not exceeding ninety days.

THE LAWS OF MASSACHUSETTS

IN RELATION TO THE

SALE AND INSPECTION OF BUTTER, OLEOMARGARINE, CHEESE, ETC.

[SECTIONS 17, 18, 19, 20 AND 21, OF CHAP. 56 OF THE PUBLIC STATUTES, AS AMENDED BY CHAP. 310 OF THE ACTS OF 1884, AND CHAP. 352 ACTS OF 1885, AND CHAP. 317 OF THE ACTS OF 1886.]

SECTIONS 17. (*As amended by Section 1 of Chapter 317 of the Acts of 1886.*) Whoever by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance or compound, made in imitation or semblance of butter or as a substitute for butter, and not made exclusively and wholly of milk or cream, or containing any fats, oils or grease not produced from milk or cream, shall have the words "**IMITATION BUTTER,**" or if such substitute is the compound known as "**OLEOMARGARINE,**" then the word "**OLEOMARGARINE,**" or, if it is known as "**BUTTERINE,**" then the word "**BUTTERINE,**" stamped, labelled or marked, in a straight line, in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length, so that said words cannot be easily defaced, upon the top, side and bottom of every tub, firkin, box or package containing any of the said article, substance, or compound. The said stamp, label or mark shall contain no other words. And whoever, by himself or his agents, exposes or offers for sale any of the said article, substance or compound not in the original package, shall attach to the said article, substance or compound, in a conspicious place, a label bearing the words "**IMITATION BUTTER,**" "**OLEOMARGARINE,**" or "**BUTTERINE,**" as the article may be, in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length. And in cases of retail sales of any of said article, substance or compound not in the original packages, the seller shall, by himself or his agents, attach to each package so sold, and shall deliver therewith to the purchaser, a label or wrapper bearing in a conspicious place, upon the outside of the package, the words "**IMITATION BUTTER,**" "**OLEOMARGARINE,**" or "**BUTTERINE,**" and no other words, in printed letters, in a straight line of plain, uncondensed Gothic type, not less than one-half inch in length.

SECT. 18. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance or compound, made in imitation or semblance of cheese, or as a substitute for cheese, and not made exclusively and wholly of milk or cream, or containing any fats, oils, or grease not produced from milk or cream, shall have the words **"IMITATION CHEESE,"** stamped, labelled or marked, in printed letters of plain, uncondensed Gothic type, not less than one inch in length, so that the said words cannot be easily defaced, upon the side of every cheese-cloth or band around the same, and upon the top and side of every tub, firkin, box or package containing any of said article, substance or compound. And in cases of retail sales of any of said article, substance or compound not in the original packages, the seller shall, by himself or his agents, attach to each package so sold, and shall deliver therewith to the purchaser, a label or wrapper bearing in a conspicuous place upon the outside of the package the words **"IMITATION CHEESE,"** in printed letters of plain, uncondensed Gothic type, not less than one inch in length.

SECT. 19 (*as amended by Section 2 of Chapter 317 of the Acts of 1886*). Whoever sells, exposes for sale or has in his possession with intent to sell, any article, substance or compound made in imitation or semblance of butter or cheese, or as a substitute for butter or cheese, except as provided in the two preceding sections, and whoever with intent to deceive, defaces, erases, cancels or removes any mark, stamp, brand, label or wrapper provided for in such sections, or in any manner shall falsely label, stamp or mark any box, tub, article or package marked, stamped or labelled as aforesaid, shall for every such offence forfeit to the city or town where the offence was committed one hundred dollars, and for a second and each subsequent offence two hundred dollars.

SECT. 20. Inspectors of milk shall institute complaints for violations of the provisions of the three preceding sections when they have reasonable cause to believe that such provisions have been violated, and on the information of any person who lays before them satisfactory evidence by which to sustain such complaint. Said inspectors may enter all places where butter or cheese is stored or kept for sale, and said inspectors shall also take specimens of suspected butter or cheese, and cause them to be analyzed or otherwise satisfactorily tested, the result of which analysis or test they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admitted in evidence in all prosecutions under this and three preceding sections. The expense of such analysis or test, not exceeding twenty dollars in any one case, may be included in the costs of such prosecutions. Whoever hinders, obstructs, or in any way interferes with any inspector, or any agent of an inspector, in the performance of his duty, shall be punished by a fine of fifty dollars for the first offence, and of one hundred dollars for each subsequent offence.

Sect. 21. For the purposes of the four preceding sections, the terms "butter" and "cheese" shall mean the products which are usually known by these names, and are manufactured exclusively from milk or cream, with salt and rennet, and with or without coloring matter.

[Chapter 317 of the Acts of 1886.]

Sect. 3. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance, or compound made in imitation or semblance of butter, or as a substitute for butter, and not made exclusively and wholly of milk or cream, or containing any fats, oils, or grease not produced from milk or cream, contained in any box, tub, article, or package marked or labelled with the word "dairy" or the word "creamery," shall for every such offence forfeit to the city or town where the offence was committed one hundred dollars, and for a second and each subsequent offence two hundred dollars.

Sect. 4. Every person who conveys any imitation butter, oleomargarine or butterine in carriages or otherwise, for the purpose of selling the same in any city or town, shall, within thirty days of the passage of this act, and annually on the first day of May or within thirty days thereafter, be licensed by the inspector or inspectors of milk of such city or town, to sell the same within the limits thereof, and shall pay to such inspector or inspectors fifty cents to the use of the city or town. The inspector or inspectors shall pay over monthly to the treasurer of such city or town all sums collected by him or them. In towns in which there is no inspector of milk, licenses shall be issued by the town-clerk. Licenses shall be issued only in the names of the owners of carriages or other vehicles, and shall, for the purposes of this chapter, be conclusive evidence of ownership. No license shall be sold, assigned, or transferred. Each license shall record the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person engaged in carrying or selling imitation butter, oleomargarine, or butterine, and the number of the license. Each licensee shall, before engaging in the sale of any of the articles as aforesaid, cause his name, the number of his license, his place of business, to be legibly placed on each outer side of all carriages or vehicles used by him in the conveyance and sale of the articles as aforesaid, in Gothic letters, not less than one inch in length, and he shall report to the inspector or inspectors any change of driver or other person employed by him which may occur during the term of his license. Whoever, without being first licensed under the provisions of this section, sells any of the articles as aforesaid, or exposes or offers them for sale from carriages or other vehicles, or has them in his custody or possession with intent so to sell, and whoever violates any of the provisions of this section, shall, for the first offence, be punished by fine of not less than thirty nor more

than one hundred dollars; for a second offence, by a fine of not less than fifty nor more than three hundred dollars.

SECT. 5. Every person, before selling or offering for sale any of the articles as aforesaid in a store, booth, stand, or market-place in a city or in a town in which an inspector or inspectors of milk are appointed, shall within thirty days of the passage of this act, and annually on the first day of May or within thirty days thereafter, register in the books of such inspector or inspectors, or if there be no inspector then in the books of the town-clerk, and shall pay to him or them fifty cents to the use of such city or town; and whoever neglects to so register shall be punished for each offence by a fine not exceeding twenty dollars.

LAWS OF MASSACHUSETTS,

IN RELATION TO THE

SALE AND INSPECTION OF VINEGAR.

[CHAPTER 60, SECTION 69, AS AMENDED BY CHAPTER 257 ACTS OF 1883.]

SECT. 69. Every person who manufactures for sale, or offers or exposes for sale as cider vinegar, any vinegar not the legitimate product of pure apple juice, known as apple cider, or vinegar not made exclusively of said apple cider, or vinegar into which foreign substances, drugs or acids have been introduced, as may appear by proper tests, shall for each offence be punishable by fine of not less than fifty, nor more than one hundred dollars.

SECT. 70. Every person who manufactures for sale, or offers for sale, any vinegar found upon proper tests to contain any preparation of lead, copper, sulphuric acid, or other ingredient injurious to health, shall for each such offence be punished by fine of not less than one hundred dollars.

SECT. 71. The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of vinegar, who shall be sworn before entering upon their duties.

[CHAPTER 307 ACTS OF 1884, AS AMENDED BY CHAPTER 150 ACTS OF 1885.]

SECTION 1. No person shall by himself, his servant or agent, or as the servant or agent of any other person, sell, exchange, deliver, or have in his custody or possession, with intent to sell or exchange, or expose or offer for sale or exchange any adulterated vinegar, or label, brand or sell as cider vinegar, or as apple vinegar, any vinegar not the legitimate product of pure apple juice, or not made exclusively from apple cider.

SECT. 2. All vinegars shall be without artificial coloring matter, and shall have an acidity equivalent to the presence of not less than four and one-half per cent. by weight of absolute acetic acid, and in the case of cider vinegar shall contain in addition not less than two per cent. by weight of cider vinegar solids upon full evaporation over boiling water; and if any vinegar contains any artificial coloring matter or less than the above amount of acidity, or, in the case of cider vinegar, if it contains

less than the above amount of acidity or of cider vinegar solids, it shall be deemed to be adulterated within the meaning of this act.

SECT. 4. Whoever violates any of the provisions of this act shall be punished by fine not exceeding one hundred dollars.

DECISIONS OF THE SUPREME JUDICIAL COURT OF MASSACHUSETTS IN RELATION TO THE LAWS RELATIVE TO THE SALE AND INSPECTION OF MILK.

COMMONWEALTH *v.* FRANK W. SPEAR.

SUFFOLK, SS. JANUARY, 1887.

Adulterated milk; Proof of Adulteration; Ruling Requested; Statute.

Indictment, charging the defendant with having in his possession adulterated milk, with intent unlawfully to sell the same.

At the trial in the Superior Court, before Staples, J., to prove the milk adulterated, the government relied upon one Jordan, who testified that he was not an Inspector of Milk; that he was an analyst in the inspector's employ; that he received from one Mullen, an employé of said inspector, the milk upon which this indictment was founded; and that he analyzed said milk. Under objection, Jordan was permitted to state the result of his analysis from memory, using a memorandum made by him at the time of analysis to refresh his memory. No evidence was introduced of any record or preservation as evidence of the result of such analysis or test; no evidence of any certificate of such result, and no certificate of any kind, was introduced; and no evidence of compliance with the Pub. Sts., c. 57, Sects. 1 and 2, was offered. The defendant, when objecting to the introduction of this evidence of analysis by Jordan, requested the judge to rule:—

1. That, before evidence of the result of an analysis of milk can be introduced, the government must prove that the requirements of the Pub. Sts., c. 57, Sect. 1, have been complied with.

2. That the government must prove that the requirements of the Pub. Sts., c. 57, Sect. 2, have been complied with, before the analysis of milk can be introduced in evidence.

3. That evidence of the result of an analysis of milk is not admissible in evidence, unless a certificate of record of the result of such an analysis has been made by a sworn inspector.

4. That evidence of the result of an analysis of milk is not admissible, unless said analysis is made by a sworn inspector.

5. That evidence of the result of an analysis of milk is not admissible, unless the facts of such analysis are testified to by a sworn inspector

6. That an analysis of milk made by any person other than a sworn inspector is not admissible in evidence.

The judge refused to give these rulings, and the evidence of Jordan was admitted. Jordan further testified that, by reason of the requirements of the Sts. of 1884, c. 310, Sect. 4, he reserved a portion of said sample, which he sealed; and, upon cross-examination, Jordan described his method of reserving and sealing said portion, as follows: He took one-half of the sample of milk received by him; to that half part he added a few drops of carbolic acid, to preserve it; then he poured the part containing the carbolic acid into a bottle, into which he put a cork; and then he cut the cork close to the top of the bottle, and over it spread sealing-wax.

A chemist and analyst called by the defendant testified that he received said half part so reserved from the inspector's office between three and four months after July 18, the date of the taking of the milk; that, when given to him by Jordan, there was a cork only in the bottle; that it was not sealed; that he called Jordan's attention to the fact that said bottle was not sealed, and that Jordan then retook the bottle and sealed it at that time; that he analyzed said portion, and found that fermentation of the milk had taken place. The evidence of said chemist was contradicted by Jordan.

The defendant requested the judge to instruct the jury: —

1. If they found, on the evidence, that a portion of the sample was reserved, put into a bottle, and a cork only used as a cover to the bottle, that this was no compliance with the Sts. 1884, c. 310, Sect. 4, as to the sealing of such reserved portion.

2. That, if the jury so found the fact, they should find for the defendant. The judge refused to give these rulings, and instructed the jury that they might consider the evidence as bearing upon the credibility of the government witnesses; that, if the government relied on the method of proof by certificate provided in the statute, they must conform to all its provisions; that when as here, they relied on the oral evidence of the analyzer, such evidence was not incompetent; and that it would warrant a conviction, if it satisfied the jury beyond a reasonable doubt that the milk which the defendant had in his possession, with intent to sell, was adulterated within the definition of the statute. The defendant further requested the Judge to instruct the jury that, as a matter of law, the reservation of a portion of the sample taken, with the addition of carbolic acid, is not a reservation of a portion of the sample in accordance with the Statutes of 1884, c. 310, Sect. 4.

This ruling the judge refused to give, and ruled that it was a question of fact for the jury under proper instructions. The defendant further requested the judge to instruct the jury: —

1. That there is no lawful evidence upon which the jury can find the defendant guilty of having adulterated milk in his possession, as no certificate or record of analysis has been introduced in evidence.

2. That there being no evidence of any record of any test or analysis of the milk, in accordance with the Pub. Stats. c. 57,

Sect. 2, there is no legal evidence for them to consider. These instructions the judge refused to give.

The jury returned a verdict of guilty, and the defendant alleged exceptions.

J. H. & H. W. B. Cotton for the Defendant.

Attorney General for the Commonwealth.

OPINION.

DEVENS, *J.* The first and second sections of the Pub. Sts., c. 57 (the second section being amended by Section 3 of the St. of 1884, c. 310), provide for the appointment of inspectors of milk, who may enter all places where milk is stored or kept for sale and "all persons engaged in the sale of milk shall, on request in writing of an inspector, deliver to the person so making the request, a sample or specimen sufficient for the purpose of analysis of the milk then in his possession," etc. "Said inspector shall cause the sample or specimen of milk, as delivered, to be analyzed or otherwise satisfactorily tested, the result of which analysis or test they shall record and preserve as evidence." The fourth section of the St. of 1884, c. 310, provides that, before making the analysis of any sample, the person making the same shall reserve a portion, which shall be sealed, and, "in case of a complaint against any person, the reserved portion of the sample, alleged to be adulterated, shall, upon application, be delivered to the defendant or his attorney." The defendant contends that the sections of Chap. 57 provide for an exclusive mode of proof of adulteration of milk in case of prosecution therefor; and that it is only when a lawfully appointed inspector shall have taken the sample, and following all provisions of the law, shall have made the analysis and prepared the certificate, that a defendant can be convicted. He further contends that these sections are imperative, and intended to give a defendant the benefit and safeguard of this mode of proof to the exclusion of any other, the inspectors being public officials required to follow in their conduct the rules defined by legislation. On examination of these provisions it is seen that the statute intended to provide for a peculiar and somewhat unusual mode of proof of adulteration by means of the record of the analysis or tests made. While, if this is relied on, it would be necessary, in order that such record should be evidence, and all the requisitions of law should have been complied with, there is no suggestion that other appropriate modes of proof of the offence, as they before existed, were to be rejected. The defendant's contention would require us to hold that, even if it were proved by the testimony of eye-witnesses that the defendant had actually adulterated milk and afterwards sold it as unadulterated, he could not be convicted. If parties, not official inspectors, might furnish evidence of milk taken and analyzed by them, the fact that the person who actually testified was an official inspector is not important. Even if, from failure to have observed all the requisitions of the law, no proper record had been made, his analysis of the milk, the character of which was disputed, properly supported by his testimony as

a witness, could be received and considered by the jury. The defendant further claims that, in order that any analysis of the milk should be used in evidence, it was necessary that the provisions of Section 4, of Statute of 1884, Chapter 310, above cited, should have been complied with. Of this position the defendant appears to have had the full benefit. The witness who was the analyst had testified to setting aside a sample of the milk, in a bottle properly corked and sealed. It was denied by the chemist to whom he handed it at the instance of the defendant that it was thus sealed; and the question of the credibility of the government witness was submitted to the jury. The defendant requested a ruling, indeed, that the fact that the bottle was corked only, and not sealed, was not a compliance with the statute; but, by submitting the question of the credibility of the government witness who had testified that it was sealed, the defendant had the benefit of his request. It was to be determined as a question of fact, and not of law, whether the carbolic acid added to the milk would change its character, make the analysis impossible or difficult, or in any way injuriously affect the use of the sample for the purpose of analysis. If, for practical purposes, the sample reserved was not affected by the addition made, the statute had been complied with.

Exceptions overruled.

Commonwealth *v.* Webster Smith.

Suffolk, ss. January, 1887.

Adulterated Milk. — Evidence of intent to sell.

Complaint under the Pub. Sts., Chap. 57, Sect. 5, charging the defendant with having in his possession adulterated milk, with intent unlawfully to sell the same.

At the trial in the Superior Court, before Staples, J., the government called John Killeen, who testified that he was collector of samples, employed by James F. Babcock, the Inspector of Milk for the city of Boston; that he did not know the defendant; that he saw the team of the defendant at the corner of West Canton street and West-Canton street place, in Boston, at about six o'clock in the morning of October 17, 1885; that the man on the team gave him the name of A. Campbell, and the number on the team was 367; that the name on the team was W. Smith; that he took about a pint of milk as a sample, put it in a can of his own, labelled it, and took it to the Milk Inspector's office, and delivered it to one Jordan, an analyst. On cross-examination he testified that he did not see the defendant when he took the sample; that he took the sample from an eight-quart can, which was not marked "skimmed milk," and that there were several cans in the wagon. James O. Jordan testified that he was an analyst; that on October 17, 1885, he received from Killeen the pint sample testified to; that he analyzed it by evaporating one teaspoonful of it, and weighing the residual solids, and, by comparing the weight of the residuum with the original weight of the teaspoonful, he found that the teaspoon-

ful contained 11.78 per cent. of milk solids by weight. James F. Babcock testified that he was the Milk Inspector of the city of Boston; that after the complaint in this case was made the defendant came to his office and wanted to know how the milk stood; that he told the defendant, and showed him the card on which the analysis was set down; that in July, 1885, the defendant made an application in writing for a license to sell milk, in Boston, in which he stated that he lived in Lexington; that the number of his wagon was 367; and that the name of his driver was A. Campbell. The latter evidence was admitted for the sole purpose of showing that the wagon, from which the sample was taken, was the wagon of the defendant; and that the man who gave his name as A. Campbell, was the defendant's driver.

The defendant asked the judge to rule that the government must prove a possession by the defendant, personally, in the County of Suffolk, in order to succeed under this complaint. This ruling the judge declined to give. The defendant then asked the judge to rule that the evidence in this case did not authorize a verdict of guilty. This ruling the judge also declined to give. The defendant also asked the judge to rule that, "if the evidence leaves the jury in doubt, whether the identical milk which was analyzed in this case was changed by the servant, or by any one else other than the defendant, after it left the defendant's possession, so that its percentage of milk solids was reduced, the jury must acquit the defendant." This ruling the judge gave, and also instructed the jury, "If an agent substitute poor milk for good, it raises an interesting question as to the master's liability. If you believe, in this case, that the servant changed the milk, you must acquit. If you see any evidence of that, you must give the defendant the benefit of it." The judge then instructed the jury among other things, as follows: "Knowledge by the defendant of the amount or percentage of milk solids in this milk is entirely unimportant. The law fixes the standard at thirteen per cent. All milk containing less than thirteen per cent. of milk solids is deemed adulterated milk. There are only two questions for the jury to pass upon, viz.: 1. Was the milk in question adulterated milk, as alleged in the complaint? 2. Did the defendant have that milk in Boston in his possession, by his servant, with the intent unlawfully to sell the same?

The jury returned a verdict of guilty, and the defendant alleged exceptions.

S. Hoar for the defendant.

Attorney-General for the Commonwealth.

OPINION.

DEVENS *J.* Even if it be conceded that the milk which the defendant was charged with having in his possession with intent to sell was adulterated, it is the defendant's contention, and this was the only point argued, that the case for the government afforded no evidence of any intent on the part of the defendant to sell, even if it were true that the milk was adulterated, and was in the possession of

the defendant by his servant. The team of the defendant, bearing his name, and being also numbered, was at a corner of a public street and place in the city, in the early morning. The defendant's servant was upon it, and there were several cans in the wagon. From one of the cans (which was an eight-quart can), the Collector of Milk Samples took a sample, which was alleged adulterated milk. The fact that the wagon was that of the defendant, the place where it was, the time when it was there, the different cans and the contents, the fact that the Sample Collector was permitted, without objection from the defendant's servant, who had the wagon and its contents in charge, to take a sample, furnished some evidence against the defendant of an intent to sell the milk, which the jury were properly allowed to consider.

Exceptions overruled.

COMMONWEALTH *v.* JOHN H. KENNISON,

SUFFOLK, ss. JANUARY, 1887.

Complaint to the Municipal Court of the South Boston district, under Sect. 2, Chap. 318, of the Acts of 1886, alleging that on the first day of July, 1886, the defendant "did have in his possession a certain quantity, that is to say, one pint of milk, not of good standard quality; that is to say, milk containing less than thirteen per cent. of milk solids, with intent, etc., to sell the same."

At the trial in the Superior Court, before Staples, J., the defendant before the jury was empanelled made and filed a motion to quash. The said motion was not made in the Court below. This motion was overruled.

Upon the trial to show that the milk contained less than thirteen per cent. of milk solids, the government offered in evidence the analysis which the Milk Inspector caused to be made of a sample of milk taken from the defendant's milk-wagon in Boston, July 1, 1886; but it appeared that the chemist did not reserve a portion of the sample for the defendant, as provided in Acts 1884, Chap. 210, Sect. 4, until about two hours after commencing the analysis, though he did reserve and seal such portion before completing the analysis, and the defendant subsequently received the same. It appeared that the Inspector, at the time of taking a sample of milk for analysis from the defendant's carriage, did, at the request of the defendant, seal up and deliver to the defendant, from whose possession the sample was taken, a portion so taken, taking a receipt therefor as provided in Acts 1886, Chap. 318, Sect. 1. No analysis was made of the portion aforesaid. Upon this, the defendant objected, that evidence of the analysis was inadmissible; but the evidence was admitted. It appeared by the official analysis that the milk contained 11.18 of milk solids. The analysis of the reserved portion, last aforesaid, caused to be made by the defendant, showed 9.78 of milk solids. It also appeared that the milk in question was milk produced in the month of June, and that the defendant had purchased of a farmer, and taken possession of said

milk on the thirtieth day of June, 1886, for the purpose of selling the same, and had it in his possession on the morning of July first, the aforesaid, for the same purpose, when the sample was procured of him by the Inspector. The evidence of the government related to July 1, 1886.

Upon this evidence the defendant asked the Court to rule that, if the defendant received the milk into his possession with intent to sell on the thirtieth day of June, he had it under the twelve per cent. standard July 1, and could not be properly convicted upon this complaint.

The Court declined so to rule, and did rule that if he had in his possession in Boston, July 1, 1886, with intent unlawfully to sell the same in this Commonwealth, milk containing less than thirteen per cent. of milk solids, the jury would be warranted in convicting him; that in this case, time was material and of the essence of the offence; that the government was confined strictly to July 1, 1886, in the proof of the offence, and could not go back of that day.

The jury returned a verdict of guilty; and the defendant alleged exceptions.

James A. McGeough for the defendant.

Attorney-General for the Commonwealth.

OPINION.

FIELD, *J.* The offence of selling, or having in one's possession with intent to sell, milk not of good standard quality, was created by Statutes 1886, Chap. 318, Sect. 2.

The quality required by the statute in months of May and June, is different from that for the rest of the year; but this distinction relates to the time when the milk is sold or kept in possession with intent to sell, and not to the time when the milk is obtained from the cow. As this complaint alleges, that on the first day of July, the defendant had in his possession "one pint of milk not of good standard quality, that is to say: milk containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same within this Commonwealth," it charges an offence within the statute. It is not necessary in the complaint to negative the exception of the months of May and June, because the allegation of time in the complaint is material, and of itself excludes the months of May and June. The defendant contends that, Stat. 1886, Chap. 318, Sect. 2, is inoperative because it purports to be an amendment of Pub. Stat., Chap. 57, Sect. 5 and 9, and he says that said Section 9, was repealed by Stat. 1885, Chap. 352, Sect. 6, and the argument is that an amendment of a repealed statute, is a nullity. By Statutes 1885, Chap. 352, Sect. 6, "Section nine of chapter 57, of the Pub. Stats., is hereby amended so as to read as follows, etc.," and by Stats. 1886, Chap. 318, Sect. 2, "Section nine of Chap. 57, of the Pub Stats., is hereby amended, so as to read as follows, etc.," and in each case there follows, a sentence which covers the whole subject of the original section, and may well be held to have impliedly repealed the preceding provisions. The intention of the Legislature is plain, that

after Stats. 1885, Chap. 353, took effect instead of Pub. Stats., Chap. 57, Sect. 9, the sixth section of Chap. 353, Stats. of 1885 should be in force, and that after Stats. of 1886, Chap. 318, took, effect, section 2, of this statute should be in force instead of Section 6, Chap. 353, Stat. 1885. The sections in each statute are complete in themselves, and, being substitutes for each other, stand like independent enactments. The remaining exception is to the admission of the evidence of the analysis of the milk, the objection is that, "the chemist did not reserve a portion of the sample for the defendant, as provided in Acts 1884, Chap. 210, Sect. 4, until about two hours after commencing the analysis, the inspector at the time he took the sample delivered to the defendant a portion of the sample taken in compliance with Stats. 1886, Chap. 318, Sect. 1 and 3." We are of the opinion that Stats. 1884, Chap. 210, Sect. 4, is impliedly repealed by Stats. 1886, Chap. 318.

The Pub. Sts., Chap. 57, Sect. 2, provide for the taking of specimens of milk, the analysis of the milk, and that a certificate of the result sworn to by the analyzer should be admissible as evidence, but it did not require that any portion of the sample of milk taken should be delivered to the person from whom it was taken. This section of the Public Statutes was amended by St. 1884, Chap. 210, Sect. 3, which was intended as a substitute for the section amended, and Sect. 4 of the statute required the person making the analysis, before commencing it, to reserve a portion of the sample, which should be tested, and if a complaint was made, should, upon application, be delivered to the defendant, or his attorney. The statute did not declare what the consequence would be if this was not done. Sect. 2 of Chap. 57, Pub. Sts., now again amended by St. 1885, Chap. 352, Sect. 4, which was intended as a substitute in Sect. 3, Chap. 210, St. of 1884, and was again amended by St. 1886, Chap. 318, Sect. 1, which was intended as a substitute for said Sect. 3, and the last amendment, provides that at the time the sample is taken, if the person taking the sample of milk be requested so to do, "a portion of each sample so taken" shall "be sealed and delivered to the owner or person from whose possession the same is taken," etc., and Sect. 3 of the same statute provides that if the inspector or collector, after being so requested, refuses or neglects to seal up and deliver a portion of the sample taken, to the owner or person from whose possession the sample is taken, "no evidence shall be received in any Court of the results of the analysis," etc. We think that the provisions we have stated from St. 1886, Chap. 318, were intended to be a substitute for the provisions of St. 1884, Chap. 210, Sect. 4, and that the St. of 1886, Chap. 318, contains all the provisions which were intended to be in force after its passage concerning the testing of samples of milk, the analysis of them, and the use of the results of the analysis as evidence.

Exceptions overruled.

DIGEST OF SOME OF THE MORE IMPORTANT OPINIONS OF THE SUPREME JUDICIAL COURT IN RELATION TO THE MILK LAW.

Pub. Stats., Chap. 57. Sect. 2, so far as it authorizes inspectors of milk to enter all carriages used in the conveyance of milk, and, whenever they have reason to believe any milk found therein is adulterated, to take specimens thereof for the purpose of analyzing or otherwise satisfactorily testing the same, is constitutional.

Commonwealth *v.* Carter, 132 Mass., 12.

1. A person may be convicted of selling adulterated milk, under Pub. Stats., Chap. 57, Sect. 5 (Gen. Stats., Chap. 49, Sect. 151), although he did not know it to be adulterated; and an averment in the indictment that he had such knowledge may be rejected as surplusage.

2. It is not necessary, in such indictment, to aver that the milk was cow's milk.

3. An indictment under alleging a sale of adulterated milk to a woman is not defeated by proof that she was married and was acting as agent for her husband, if the seller had no notice, express or implied, of these facts.

4. An indictment under Pub. Stats., Chap. 57, Sect. 5 (Gen. Stats., Chap. 49, Sect. 151), which charges that the defendant sold a certain quantity of "adulterated milk, to which a large quantity, that is to say, four quarts, of water had been added," is not bad for duplicity.

Commonwealth *v.* Farren, 9 Allen, 489.

1. An indictment which alleges that the defendant "did unlawfully keep, offer for sale and sell," adulterated milk, charges but one offence.

2. In support of such indictment, one, who in a great many instances has used a lactometer for the purpose of testing the quality and the purity of milk, may testify to the result of an experiment made by him with the same lactometer upon the milk in question, although no evidence is offered as to the character of the instrument

Commonwealth *v.* Nichols, 10 Allen, 199.

1. At the trial of an indictment on Pub. Stats., Chap. 57, Sect. 5 (Statute of 1868, Chap. 263), for selling "adulterated milk, there was evidence that the defendant [who was a son of the owner of a milk-route], with a companion who was in the same employment with himself, knowingly adulterated milk on its way for distribution to his father's customers, and then, having charge, with his companion, of its distribution from the wagon on which it was conveyed upon the route, caused a can of it to be delivered to one of the customers by the hand of his companion. *Held*, that he had no ground of exception to instructions to the jury, that, in

the absence of proof of any previous contract to supply milk to the customer, the delivery might be deemed an act of sale; nor to an instruction framed on a supposition that the jury might find that he was in the employment of his father, although there was no averment in the indictment to that effect.

Commonwealth *v.* Haynes, 107 Mass., 194.

A person may be convicted of selling adulterated milk upon a complaint under Pub. Stats., Chap. 57, Sect. 5 (Statute of 1880, Chap. 209, Sect. 3), without allegation or proof that he knew it to be adulterated.

Commonwealth *v.* Evans, 132 Mass., 11.

A complaint under Pub. Stats., Chap. 57, Sect. 5, alleging that the defendant, at a time and place named, had in his possession a certain quantity, to wit: one pint of adulterated milk containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient, without further alleging that the milk was analyzed, and found on analysis to contain less than thirteen per cent. of milk solids. At the trial of a complaint under Pub. Stats., Chap. 57, Sect. 5, alleging that the defendant had in his possession adulterated milk, to wit: milk containing less than thirteen per cent. of milk solids, with intent to sell the same, it is immaterial in what manner the quantity of milk solids has been reduced below thirteen per cent., if the intent is to sell the milk as pure milk, and not as skimmed milk.

Commonwealth *v.* Bowers, 140 Mass., 483.

Pub. Stats., Chap. 57, Sect. 9 (Statute of 1880, Chap. 209, Sect. 7), providing that "in all prosecutions under this act," for selling adulterated milk, "if the milk shall be shown upon analysis to contain more than eighty-seven per centum of watery fluid or to contain less than thirteen per centum of milk solids, it shall be deemed for the purposes of this act to be adulterated," is constitutional.

Commonwealth *v.* Evans, 132 Mass., 11.

A complaint under the Pub. Stats., Chap. 57, Sects. 5, 9, alleging that the defendant, at a time and place named, had in his custody and possession a certain quantity, to wit, one pint, of adulterated milk, to wit, milk then and there containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient.

Commonwealth *v.* Keenan, 139 Mass., 193.

A complaint, under the Pub. Stats., Chap. 57, Sect. 5, alleging in one count, that the defendant, at a time and place named, sold a certain quantity, to wit, one pint of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, and, in another count, alleging that the defendant, at the same time and place, had in his possession a certain quantity, to wit, one pint of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient, without further alleging that

the milk was analyzed, and found, on analysis, to contain less than thirteen per cent. of milk solids.

The Pub. Stats., Chap. 57, Sect. 10, do not prohibit any person not an inspector of milk from making a complaint for a violation of the provisions of the chapter.

A complaint, under the Pub. Stats., Chap. 57, Sect. 5, alleging that the defendant sold one pint of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, is not supported by proof that he sold the milk, as skimmed milk out of a tank marked as required by Sect. 7, although the milk was watered.

A complaint, under the Pub. Stats., Chap. 57, Sect. 5, alleging a sale of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, is supported by proof of a sale of milk, which, by the removal of a part of the cream, has been reduced in solids below thirteen per cent. unless the milk was sold as skimmed milk, and out of a vessel, can, or package, marked as required by Sect. 7; and it is not necessary that a complaint charging such an offence should be drawn under Sect. 6.

Commonwealth *v.* Tobias, 141 Mass., 129.

TABLE. — Showing the Average Composition of Cows' Milk, according to Standard Authorities.

AUTHORITY.	Total Solids.	Fat.	Not Fat.	Ash.
BOUDET. — Average proposed and adopted August 27, 1857, by the *Conseil d'Hygiene*, Paris	13.00	4.00	9.00	0.70
ADAM. — Composition of Milk from five districts near Paris	13.10	4.10	9.00	0.70
BABCOCK. — (Milk Inspector of Boston, 1885) Average of 130 samples	13.11	3.45	9.66	
GIRARD. — Average of all the authorities quoted. (Report of Paris Municipal Laboratory.)	13.30	4.00	9.30	0.70
BOUCHARDAT. — Mean of a large number of analyses. (*Traité d'Hygiene*, p. 136)	13.30	4.10	9.20	0.70
DAVENPORT. — (Milk Inspector of Boston, 1884. Mixed milk of 31 cows	13.32	3.70	9.62	
CAMERON. — Average composition of milk from 42 cows at Agricultural Institute, Dublin	13.40	4.00	9.40	0.70
WURTZ — Average of a large number of analyses. (*Dictionnaire de Chimie*, Vol. II., p. 192–194) . . .	13.50	4.00	9.50	0.60
BELL. — Average of 181 cows from 17 farms. (The "Analyst," 1877.)	13.60	3.70	9.90	0.76
MARTIN & MOELLER. — Average of 296 cows from different sections of New York State. (Report on Milk and its Adulterations, New York, 1885)	13.73	4.21	9.52	0.71
NEWTON. — Average of 85 dairies in different sections of New Jersey	13.80	4.22	9.58	0.65
SHARPLES. — Average of 19 cows ("Proc. Amer. Acad. Science," 1875.)	14.49	4.83	9.66	0.66
Average of all the above mentioned authorities	13.46	4.03	9.43	0.69

TABLE.—Showing the Percentage of Added Water in a Mixture of Standard Milk and Water.

Per cent. of Solids.	Composition.		Per cent. of Solids.	Composition.	
	Added Water.	Standard Milk.		Added Water.	Standard Milk.
12.87	1	99	10.27	21	79
12.74	2	98	10.14	22	78
12.61	3	97	10.01	23	77
12.48	4	96	9.88	24	76
12.35	5	95	9.75	25	75
12.22	6	94	9.62	26	74
12.09	7	93	9.49	27	73
11.96	8	92	9.36	28	72
11.83	9	91	9.23	29	71
11.70	10	90	9.10	30	70
11.57	11	89	8.97	31	69
11.44	12	88	8.84	32	68
11.31	13	87	8.71	33	67
11.18	14	86	8.58	34	66
11.05	15	85	8.45	35	65
10.92	16	84	8.32	36	64
10.79	17	83	8.19	37	63
10.66	18	82	8.06	38	62
10.53	19	81	7.93	39	61
10.40	20	80	7.80	40	60

TABLE.—Showing the Proportion of Water added to Standard Milk in Frequently Occurring Mixtures.

Per cent. of Solids.	Parts of Water added to Standard Milk.	Per cent. of Solids.	Parts of Water added to Standard Milk.
12.50	1 to 25	11.14	1 to 6
12.39	1 to 20	10.83	1 to 5
12.19	1 to 15	10.40	1 to 4
11.81	1 to 10	9.75	1 to 3
11.70	1 to 9	8.71	1 to 2
11.55	1 to 8	7.80	1 to 1½
11.37	1 to 7	6.50	1 to 1

TABLE. — Showing Comparison of Degrees of Lactometers and Specific Gravity.

Specific Gravity.	Orange County Lactometer.	New York Board of Health Lactometer.
1.0270	17.	93
1.0275	17.5	95
1.0280	18.	97
1.0285	18.2	98
1.0290	18.4	100
1.0295	18.6	102
1.0300	18.8	104
1.0305	19.	105
1.0310	19.3	107
1.0315	19.7	109
1.0320	20.	110
1.0325	20.3	112
1.0330	20.7	114
1.0335	21.	116
1.0340	21.3	117
1.0345	21.7	119
1.0350	22.	120

TABLE. — Showing Comparison of Degrees of New York Board of Health Lactometer and Specific Gravity.

Degree of Lactometer.	Specific Gravity.	Degree of Lactometer.	Specific Gravity.	Degree of Lactometer.	Specific Gravity.
90	1.0261	101 . . .	1.0293	111 . . .	1.0322
91	1.0263	102 . . .	1.0296	112 . . .	1.0325
92	1.0267	103 . . .	1.0299	113 . . .	1.0328
93	1.0270	104 . . .	1.0301	114 . . .	1.0331
94	1.0273	105 . . .	1.0305	115 . . .	1.0334
95	1.0276	106 . . .	1.0307	116 . . .	1.0336
96	1.0278	107 . . .	1.0310	117 . . .	1.0339
97	1.0281	108 . . .	1.0313	118 . . .	1.0342
98	1.0284	109 . . .	1.0316	119 . . .	1.0345
99	1.0287	110 . . .	1.0320	120 . . .	1.0348
100	1.0290				

INDEX.

	PAGE.
Analysis of milk	14
Annatto, detection of in milk	17
" " " butter	35
Boracic acid in milk	19
Butterine licenses	34
Colored milk	16
Comparison of lactometers and specific gravity	61
Complaints in Municipal Court	5
" " Superior Court	5
Decisions of the Supreme Court	49
Commonwealth *vs.* Bowers	58
" " Carter	57
" " Evans	58
" " Farren	57
" " Haynes	58
" " Keenan	58
" " Kenneson	54
" " Nichols	57
" " Spear	49
" " Smith	52
" " Tobias	59
Expenses of the department	8
Income of the department	8
Laws relating to milk	40
" " " oleomargarine	44
" " " vinegar	48
Methods of inspection	9
Milk, analyses of	19
" average composition of milk	59
Milk inspections	3
Milk laws, changes in the	24
" " relating to	40
" " licenses	2
" " methods of examination of	14
" " standard of	26
Oleomargarine, changes in the laws relating to	33
" detection of	34
" healthfulness of	32
" inspections	34
" laws relating to	44
" mode of manufacture	31
Organization of the department	39
Result of inspections	8
Statistics of the milk business	6
Vinegar detection of adulterations	35
" inspection	35
" laws relating to	48
Warning notices	13

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